City of Seattle
Municipal Stormwater NPDES Permit

2005 Annual Report

Providing an update on the status of stormwater program activities conducted during 2005 with updates, as appropriate, for 2006.

Submitted pursuant to Special Condition S10 of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for discharges from municipal separate sewers for the Cedar/Green Water Quality Management Area.

Municipal Stormwater NPDES Permit No. WASM 23003

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2005 Stormwater Management Program Update Report

1. INTRODUCTION

This report is submitted by the City of Seattle pursuant to Special Condition S10 of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for discharges from municipal separate storm sewers for the Cedar/Green Water Quality Management Area. Seattle received coverage under the NPDES Municipal Discharge Permit from Washington State Department of Ecology (Ecology) in 1995. In 1997, Seattle's Stormwater Management Program (SWMP) was approved by Ecology as meeting the requirements of that permit. The report, highlighting various stormwater runoff management activities conducted by the City of Seattle, covers the 12-month period between January 1, 2004, and December 31, 2005, with updates as appropriate through mid-2006.

This report is divided into four sections.

1. Background: Stormwater and the City of Seattle. This section contains an overview of the nature of urban stormwater runoff and the challenges facing fully built environments like Seattle. It also provides an overview of the organizational responsibilities of key departments in the City involved in stormwater management and water quality.
2. Seattle's Stormwater Management Program Components. In this section, the various elements of Seattle's stormwater programs are summarized. Accomplishments during the reporting period are included and, for readers desiring additional information, a point of contact is provided for each program element.
3. Other Permit Reporting Requirements. The City's NPDES Municipal Stormwater Discharge Permit contains mandatory reporting elements that do not properly fit under one of the program headings in the previous section. These mandatory reporting elements are included in this section. Examples include fiscal analysis and changes in permit coverage area.
4. Next Steps. This section reflects on the challenges of stormwater management in the City of Seattle.

Two appendices are included at the end of this report:

- Appendix A provides a listing of current stormwater management programs and staff points of contact, and
- Appendix B cross-references the reporting requirements contained in the 1995 NPDES Municipal Stormwater Permit with the appropriate sections contained in this report.

Comments or questions regarding the overall organization or content of the report can be directed to Darla Inglis, Seattle Public Surface Water Division, at 206-233-7160 or darla.inglis@seattle.gov

2. BACKGROUND: CITY OF SEATTLE AND STORMWATER

2.1 STORMWATER AND THE URBAN ENVIRONMENT

Urban stormwater runoff is the water that runs off surfaces such as rooftops, paved streets, highways, and parking lots. Runoff can also come from graveled areas and hard grassy surfaces like lawns and play fields. Urban stormwater runoff can be a problem for several reasons.

Flooding: In less urban areas, much of the rainfall is intercepted by trees and vegetation or infiltrated into the soil. In urban areas like Seattle, most of the rainfall remains on the surface where it can collect in low-lying areas and cause flooding.

Human Health: Untreated stormwater can contain toxic metals, organic compounds, and bacterial and viral pathogens. Untreated stormwater generally is not of drinking water quality and can lead to closures of swimming areas.

Aquatic Environment: In urban areas, our creeks, streams, and rivers can be harmed by urban stormwater. Because so little of the rainfall is intercepted or infiltrated, high volumes of runoff can arrive in these water bodies causing erosion and sedimentation. Stormwater can also adversely affect water quality by carrying the pollution from roadways, lawns, and business activities.

In Seattle, as it collects on roadways, lawns, gutters, and other impervious surfaces, stormwater can flow through a variety of natural and/or human-made systems. These include:

Watercourse: Naturally formed swales, ravines, and stream corridors such as Thornton Creek or Longfellow Creek are all examples of watercourses. Watercourses can cross privately and publicly owned property.

Ditch and Culvert System: This kind of system involves a combination of surface ditches and culverts usually located in the public right-of-way that convey stormwater to a watercourse or a public storm drain.

Public Storm Drain: This public drainage system is wholly or partially piped and is designed to carry only stormwater. Public storm drains convey stormwater to a watercourse or directly to receiving waters such as Lake Union or Lake Washington.

Public Combined Sewer: Seattle's Combined Sewer System conveys both stormwater and wastewater through a system of pipes to King County's treatment facility at West Point. The treated water is released into Puget Sound.

To meet the challenges of urban runoff, urban areas like Seattle must implement comprehensive stormwater management programs. These programs include capital projects to address both flooding and water quality concerns, maintenance activities to keep facilities functioning properly, and a range of programs designed to influence the actions of everyone who works or lives in the watershed. Many of these programs, primarily those related to the *quality* of the stormwater (as opposed to the *quantity* of stormwater), are described in this report.

2.2 SEATTLE DEPARTMENTS INVOLVED IN STORMWATER MANAGEMENT

Among the many departments serving Seattle, the four departments and one office described below are most involved in programs and projects relating to stormwater management and receiving water impacts.

Seattle Public Utilities

Seattle Public Utilities (SPU) was formed in 1997 during a municipal reorganization that placed the four rate-supported utility services of solid waste, drinking water, wastewater and drainage into one City department. Prior to the reorganization, Seattle Engineering Department's Drainage and Wastewater Utility (DWU) performed drainage planning. Today, SPU is the designated lead department for managing stormwater, including meeting stormwater regulatory requirements, conducting water quality programs, and managing drainage-related capital projects.

Department of Planning and Development

The Department of Planning and Development (DPD) is the City department responsible for developing, administering, and enforcing development standards. It is DPD that issues development permits as required under Seattle's Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 - 22.808) and inspects sites prior to and during construction. SPU and DPD share complaint response and enforcement (inspection and response) activities. Both SPU and DPD have authority to issue notices of violation for drainage related issues. DPD manages customer complaints and inquiries related to current construction activities. SPU manages customer complaints and inquiries for non-permit related issues. All complaints and inquiries related to existing facilities are directed to SPU Customer Service.

Seattle Department of Transportation

Seattle Department of Transportation (SDOT) is responsible for the City's streets and bridges, bike paths, street trees, and traffic operations. SDOT performs such roadway maintenance activities as street sweeping and snow and ice control. The Capital Projects Division of SDOT oversees all aspects of Transportation Capital Improvement Programs (CIPs) and coordinates development and implementation of large-scale city projects.

Office of Sustainability and the Environment

The Office of Sustainability & Environment (OSE) was created in the fall of 2000 to help put sustainability into practice, both within City government and in the community at-large. While OSE's primary focus is on "municipal sustainability" (more sustainable City operations, facilities, and services), this office also seeks to promote and increase "community sustainability" (more sustainable practices by businesses, other institutions, and individual households and citizens). One of OSE's missions is to provide leadership, tools, and information to help City government and other organizations use natural resources efficiently, prevent pollution, and improve the economic, environmental, and social well-being of current and future generations.

Seattle Parks and Recreation

Responsible for several hundred parks and park facilities, Seattle's Department of Parks and Recreation (SPR) is a key player in environmental stewardship. SPR trains its staff in comprehensive Best Management Practices for various maintenance activities, reduces its pesticide use, works to remove invasive plants and replant native species, and continues its partnership with Seattle Public Utilities on creek improvement projects.

3. STORMWATER MANAGEMENT PROGRAM COMPONENTS

In this report, Seattle's stormwater- and water quality-related programs are organized into twelve functional categories as shown in Figure 1. The categories are:

Comprehensive Stormwater Planning: Includes planning processes underway used to further develop and enhance Seattle's stormwater management programs.

Partnerships: Activities aimed at coordinating stormwater-related policies, programs, and projects among jurisdictions within a watershed, and among Seattle's departments sharing similar responsibilities.

Regulations and Technical Standards: Seattle's ordinances and SPU/DPD Directors' Rules are designed to control runoff from new development, redevelopment, and construction activities. Regulations also address source control and pollution prevention at existing commercial and residential areas.

Permitting, Inspections, and Enforcement: Programs that enforce proper application of and compliance with adopted regulations and standards.

Pollution Prevention: These programs are aimed at reducing or eliminating pollution before it can be picked up by stormwater runoff and conveyed to receiving waters.

Public Involvement, Education and Stewardship: In this category are the variety of programs whose purpose is to provide opportunities for individuals and groups to become involved in environmental and water quality activities, and learn how to be better stewards of our natural resources.

Illicit Discharge/Connection Reduction: An illicit discharge occurs when something other than stormwater is allowed to enter one of our conveyance systems. The programs listed under this category are hazardous spill response, illegal dumping, water quality complaint response, the business inspection program, and the drainage system inspection program.

Operations and Maintenance – Drainage System: These programs help Seattle maintain its public drainage infrastructure.

Operations and Maintenance – Roadways: In this category are described the programs operated by SDOT to reduce stormwater impacts from public streets.

Municipal Training: Training occurs throughout many of the programs within other programmatic categories. Under this category is listed a new training program specifically aimed at improving drainage system maintenance.

Information & Date Collection, Analysis & Management: This category includes many of the programs that collect and compile information needed to evaluate performance of programmatic activities and to assess the effectiveness of policies, standards, programs, and projects over time.

Capital Improvement Program: This category includes primarily SPU–sponsored capital projects involving facilities or other improvements that address stormwater impacts.

Additional details on these programs are provided in this report.

Comprehensive Stormwater Planning

- *Surface Water Planning Unit*
- *Comprehensive Drainage Plan*
- *Restore Our Waters*
- *Basin Studies*

Partnerships

Inter-governmental

- *ESA Team*
- *NPDES Permittees*
- *IRAC*
- *Lake Union Action Team*
- *UW*
- *Local Hazardous Waste Management Program*
- *WRIA Coordination*
- *Watershed Forums*
- *Lower Duwamish Cleanup*

Regulations & Technical Standards

- *Stormwater, Grading & Drainage Control Code*
- *SPU/DPD Directors' Rules*
- *Side Sewer Code*

Permitting, Inspections & Enforcement

- *Plans & Permit Approval*
- *Water Quality Complaints*
- *Business Inspection*
- *Environmental Compliance Audit Program*
- *Drainage System Inspection*
- *Pollution Prevention Activities*
- *Lower Duwamish Waterway Source Control Program*

Pollution Prevention

- *Household Haz Waste*
- *Storm Drain Stenciling*
- *Mutt Mitt Program*
- *Resource Venture*
- *HazMat Inventory*
- *HazMat Reduction*
- *Natural Lawn Care/Soils*
- *Green Gardening*
- *Pesticide Reduction*
- *Pesticide Free Parks*

Public Involvement, Education, and Stewardship

- *Citizen Advisory Committee*
- *Environmental Education Team*
- *Salmon in Schools*
- *Environmental Grant Funding*
- *Urban Creeks & Watershed Stewardship*
- *Stormwater Outreach and Education*

Illicit Discharge Reduction

- *Spill Coordinator/Response*
- *Illegal Dumping*
- *Water Quality Complaint Response*
- *Business Inspection Program*
- *Drainage System Inspection Program*
- *SPU Environmental Audit Compliance Program*

Operations & Maintenance - Drainage System

- *Main Line Cleaning*
- *Main Line TV Inspections*
- *Drainage System Maintenance*
  - *Catch Basin Inlets*
  - *Power Rodding*
  - *Repair/Replace*
  - *Ditches*
  - *Cleaning*
  - *CCTV*
  - *Basins/Ponds*
  - *Jet Cleaning*
  - *Bridge drains*
  - *Hydrocut*

Operations & Maintenance - Roadways

- *Mechanical Sweeping*
- *Street Flushing*
- *Alley Flushing*
- *Snow & Ice Response*
- *Street Sweeping Pilot Study*

Municipal Training

- *Drainage Maintenance – Standard Operating Procedures*

Information & Data Collection, Analysis & Management

- *Information Support*
- *Receiving Waters*
- *CIP Support*
- *ESA Information*

Capital Improvement Programs

- *Natural Systems*
- *Water Quality Projects*
- *Urban Creeks Program*

Figure 1. City of Seattle Stormwater Management Programs

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3.1 COMPREHENSIVE STORMWATER PLANNING

SPU, as the lead stormwater management department for the City of Seattle, is involved in a number of planning endeavors designed to improve delivery of services and enhance environmental quality. Highlights of major planning efforts are provided below.

3.1.1 Urban Watershed Business Unit

The primary duties of the Urban Watersheds Unit include policy, project and program specification per the 2004 City of Seattle Comprehensive Drainage Plan and managing both the drainage capital and operating fund. The Unit is organized under three core business areas: Protection of Beneficial Uses, Stormwater and Flood Control, and Low Impact Development. Several milestones for 2005/6 include:

- Substantial completion of the Preliminary Engineering phase for major flood control and water quality projects in the South Park and Densmore neighborhoods of Seattle.
- Completion of the first construction phase of the High Point Natural Drainage System project in the Longfellow Creek Basin within Southwest Seattle, and substantial completion of the Pinehurst Natural Drainage System Project in the Thornton Creek Basin within Northeast Seattle.

Gary Schimek (206) 615-0519

3.1.2 Comprehensive Drainage Plan Update

SPU completed the update to their Comprehensive Drainage Plan (CDP) in 2004. The new CDP sets the direction for SPU's Drainage Programs, including service levels, programs, projects and policies related to habitat and water quality work. The CDP includes:

- A vision for surface water management that includes Seattle creeks, shoreline, and lakes as well as traditional drainage infrastructure;
- A fully developed Natural System Program that optimizes water quality and quantity management and mobility goals in the right-of-way;
- Recommendations for an expanded water quality program with increased monitoring and pollution prevention activities;
- Recommendations for flow control to creek watersheds to reduce stormwater runoff impacts; and
- A robust 6-year candidate drainage CIP with recommendations for operational and enforcement programs many of which are directed toward the benefit of Seattle's aquatic resources.

Within the CDP, the level of drainage service includes:

- Public safety as it relates to drainage;
- Protection and, where feasible, enhancement of water quality and habitat for key aquatic resources;
- Compliance with regulatory requirements; and
- Operation and management of public investment in the drainage infrastructure.

These services are expected to be applied in a manner that reflects geographic differences within the city and the corresponding service needs. SPU is in the process of implementing many recommendations from the CDP, which are covered within this report.

The Comprehensive Drainage Plan is currently available at:

> http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Plans/Comprehensive_Drainage_Plan/index.asp

Darla Inglis (206) 233-7160

3.1.3 Restore Our Waters Strategy

In April 2004 the Mayor issued Executive Order 03-04 requiring inter-departmental review of everything the City does that affects water resources inside the City limits. In September 2004 the Mayor issued the Restore Our Waters strategy, an outcome of the inter-department review, which offers a coordinated, wide-ranging, long term and science based strategy to improve all of Seattle's water resources. Supported by a Citywide Restore Our Waters Team and guided by a Community Stakeholders Group comprised of concerned citizens and representatives from the scientific, environmental, and business communities, the City is making policy decisions that focus City resources on the long-term improvement of the aquatic ecosystem.

The objectives of the Restore Our Waters strategy are to:

- Use Science-Based Guidelines to Direct Citywide Efforts;
- Make Strategic Changes to the City's Policy and Regulatory Framework;
- Move Forward on 40 Priority City Capital Projects;
- Make Investments to Ensure City Operations Support Improved Aquatic Health;
- Expand Partnerships with the Community and Private Property Owners to Restore Our Waters;
- Advance Scientific Understanding and Adaptively Manage City Efforts;
- Establish Clear, Quantifiable Goals and Measures of Progress; and
- Establish a Stakeholder Group to Promote Long-Term Coordination within City Government and between the Citizens of Seattle.

Recent accomplishments implemented in support of the Restore Our Waters Strategy:

- Created new grant program to provide residents and businesses with matching funds for habitat restoration projects (awarded 5 grants totaling $300,000).
- Completed five priority capital improvement projects including: shoreline restorations at Seward Park, Rainer Beach Park and Martha Washington Park; Duwamish/Norfolk Basin Water Quality Study; and Green Lake Alum Treatment.
- Completed natural drainage systems on 42 new blocks, improving both drainage and environmental quality in the Piper's, Longfellow and Thornton creek watersheds.

- The Environmentally Critical Areas Ordinance was updated. The following regulations are also in process of being developed or updated: the Drainage Code and the Shoreline Alternative Mitigation Program.
- A central feature of the Restore Our Waters Strategy is to translate resource aspirations into clear, quantifiable goals and to establish benchmarks for progress. The City is developing measurable Desired Future Conditions for each of the city's water bodies that are grounded in science and informed by community input. The scientific recommendations for the Desired Future Conditions of creeks are expected to be completed by the end of 2006.
- In order to improve source control at city facilities, a consultant was hired to do site inspections of 15 city facilities with high potential to pollute due to activities on the site and the potential for the site to drain to receiving water bodies. The consultant gave guidance to city departments on how they can improve their source control at these sites and departments are now addressing the consultant's recommendations. Additional source control inspections are planned for 2007.

Information about the Restore Our Waters strategy including the 2005 Annual Report is available at:

http://www.ci.seattle.wa.us/mayor/issues/row.htm

Jean White (206) 684-5185

3.1.4 Basin Studies

Norfolk Drainage Basin

The MLK Way/Norfolk CIP Project is in the preliminary engineering phase and will integrate conveyance and water quality improvements. The conveyance improvements will reduce storm drain overflows to the sanitary sewer system. Two drainage options are being considered: 1) improve a portion of the existing conveyance ditch and 2) install new culvert under I-5. The drainage system was cleaned and video-inspected in 2005. A section of the trunk line is damaged and will be replaced as part of the drainage improvements. The water quality element will reduce pollutant loading to the Duwamish Waterway. Three alternatives are being considered: shallow wet pond on the City-owned property west of I-5, deep wet pond on the City-owned property west of I-5, and new shallow west pond on City and additional property west of I-5. Project design will begin in late 2006.

Gary Schimek (206) 615-0519, Beth Schmoyer (206) 386-1199

South Park Drainage Basin

The 4th Avenue S and S Trenton St. Storm Drain Project is in the preliminary engineering phase and will integrate both conveyance and water quality improvements. The conveyance element would install new storm drains in the S Trenton St and S Director St subbasins and separate these areas from the combined sewer system. The new storm drains would connect to the existing 7th Ave S storm drain system that discharges to the Duwamish Waterway at 7th Ave S. These new storm drain systems would solve the majority of flooding problems associated with runoff in the right-of-way, which currently causes both private and public flooding problems. The new trunk drain system will also enable adjacent property owners to relieve onsite flooding if

they elect to connect to the public system. Local water quality treatment will be provided to all of the new flows added to the existing storm drain system. The design phase of the 4th Ave S and S Trenton St storm drainage improvements will begin in the second half of 2006. A new stormwater pump station will also be constructed due reduce flooding caused by tidal impacts on the drainage system.

South Park Water Quality Improvement Project. In 2005, SPU completed a preliminary evaluation of potential regional water quality improvements for the 7th Ave S storm drain system in South Park. A wide array of options was considered (end-of-pipe treatment, end-of-pipe treatment with diversion of flow from the upper and middle subbasins, and diverting runoff from a heavily industrialized area to the combined sewer system with separation and treatment of an equivalent area elsewhere in the basin). Additional screening of alternatives will continue in 2006 to coordinate water quality improvements with proposed conveyance system improvements.

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Densmore Drainage Basin

The 125th & Aurora Avenue CIP Project is in the preliminary engineering phase and will install a new drainage system along Aurora Avenue between 110th Avenue and 145th Avenue N. A flow detention and water quality element will be included in the project and will be sized, at minimum, to meet the requirements of the City's Stormwater Code. This CIP project is a joint effort between the SPU and Seattle Department of Transportation (SDOT). The project schedule is driven by SDOT's Aurora Ave N project.

The Lower Densmore CIP Project is in the development phase and will create a long-term strategic implementation plan for drainage and water quality projects within the Lower Densmore basin. The implementation plan will be guided by the goals, strategies, and policies from the 2005 Comprehensive Drainage Plan and include detailed descriptions, cost estimates, and recommended phasing of candidate projects. This project will build upon the results of the hydraulic study and water quality analysis.

The water quality analysis is focusing on evaluating potential water quality impacts to Green Lake from proposed drainage system improvements and identifying opportunities to incorporate stormwater treatment into both the trunkline and local drainage systems. In 2005, a consultant completed the Green Lake water balance analysis and prepared a draft version of an updated phosphorus model for Green Lake. In 2006 a consultant will create a hydraulic model to analyze the balance and locations of flows into and out of Green Lake.

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Thornton Creek Drainage Basin

During 2005 and the first half of 2006, the following projects in the Thornton Creek Basin were in the CIP process:

1. The Thornton Creek Water Quality Channel project will provide water quality treatment in a highly urbanized area of the South Branch of Thornton Creek. For more information on this project refer to Section 3.12.2 Thornton Creek Water Quality Channel.
2. The Pinehurst Green Grid project (located upstream of Kramer Creek) is in the construction phase and will be completed in the spring of 2006. It is a natural drainage

system project that will improve water quality and reduce flows through infiltration. For more information on this project refer to Section 3.12.1 Natural Systems.

3. The 30th Ave NE project will reduce flooding along 30th Avenue Northeast between Northeast 107th and 110th streets. The project is being re-scoped due to the recent reclassification of the ditch as a creek. The Preliminary Engineering effort will resume in Fall 2006 following re-examination the impacts of the "creek" designation and management approval of the revised scope.
4. The Jackson Park Detention Phase 2 project is in the closeout phase; as such plant establishment and monitoring continues near the completed three detention ponds and restored creek channel at Jackson Park Golf Course. Monitoring of the wetland and reporting to the Army Corps of Engineers will continue through 2009.
5. The Meadowbrook Outfall Rehabilitation project is in the design phase and will repair the three outfalls (replace with two new outfalls) that are located downstream of the flow control structure. The project is scheduled for construction in the summer of 2007.
6. SPU completed the third and final phase of restoration for Thornton Creek Park 6, a 6.5-acre natural area near the headwaters of the south branch. The 2005 project added large woody debris to the creek and removed 0.25-acres of invasive plants and added hundreds of native trees, shrubs and ferns.

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3.1.5 Public Participation in Planning Processes

(See 3.6.1, Creeks, Drainage, and Wastewater Citizen Advisory Committee)

3.2 PARTNERSHIPS

Managing stormwater, reducing pollution, and improving the conditions of our receiving waters involves the combined efforts of many City of Seattle departments as well as partnerships with other jurisdictions. Most of these collaborative efforts are described elsewhere in this report. Collaborative efforts not described elsewhere in this report are described below.

3.2.1 Intergovernmental Coordination

Below are some selected examples of how the City of Seattle is involved in partnerships with other jurisdictions sharing responsibilities within our watersheds.

ESA Team

Since the listings in 1999 of Puget Sound Chinook salmon (*Oncorhynchus tschawytcha*) and coastal bull trout (*Salvelinus confluentus*) as threatened under the Endangered Species Act (ESA), Seattle's response has included the formation of an interdepartmental, citywide ESA Team. The ESA team initially focused on five primary issues: (1) negotiations with NOAA Fisheries and United States Fish and Wildlife Service (USFWS), (2) regional coordination with Shared Strategy and Tri-County, (3) supporting regional watershed action planning, especially in WRIAs 3 & 4, 7, 8, and 9, (4) developing salmon research and habitat investments designed to protect and restore Seattle's major aquatic environments, and (5) departmental implementation of best management practices and appropriate mitigation of capital projects. This team was transformed in 2006 to better reflect the needs for implementing the Mayor's Restore Our Waters initiative. In addition, SPU's capital projects now undergo Triple Bottom Line (TBL) analysis in a much more rigorous form than in past years. TBL analysis requires

assessment of the financial, social, and environmental benefits and costs of a project. The ESA Team includes a policy representative from each department who has access to the Director of his/her Department, including SPU, City Light, SDOT, Parks, and the Department of Planning and Development. Chuck Clarke, Director of SPU, is the executive sponsor with responsibility for interdepartmental efforts and reports to the Mayor's Office.

Jean White (206) 684-5185

Coordination among NPDES Municipal Stormwater Permittees

The City of Seattle is a regular participant in the NPDES Municipal Stormwater Permittee Interagency Working Group, an ad hoc collective whose members represent all the current NPDES stormwater-permitted jurisdictions in the State of Washington, as well as the Port of Seattle, Port of Tacoma, and the Washington State Department of Ecology. The group met several times in 2005 to discuss issues related to stormwater management and the upcoming Stormwater NPDES permit.

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Interagency Resource for Achieving Cooperation

Seattle Public Utilities regularly participates in the Interagency Resource for Achieving Cooperation (IRAC) program. IRAC began in mid-1993 as a forum for state and local regulatory agencies to share their diverse regulatory perspectives. IRAC's mission is to provide the forum and structure for governmental agencies to coordinate regulations that protect human health, safety and the environment. A primary goal of IRAC is to bring agencies together to address gaps, overlaps, and inconsistencies relating to regulatory issues. One representative of SPU is presently serving on the IRAC Advisory Committee. SPU is also actively involved in the IRAC Troublesome Sites Workgroup and participates in other relevant workgroups as they form.

Ellen Stewart (206) 615-0023

Lake Union Action Team

The Lake Union Action Team (LUAT) was formed in 1988 as part of Ecology's Urban Bay Action Program. The goals of the Urban Bay Action Program include protecting ecosystems from further degradation, restoring damaged areas, and protecting the beneficial uses of the water body. The LUAT is a multi-agency body that supports the goals of the Urban Bay Action Program by coordinating regulatory and source control efforts in the Lake Union drainage basins. Members include representatives from Seattle Parks and Recreation, Seattle Department of Design, Construction and Land Use, King County Industrial Waste Program, King County Hazardous Waste Program, King County Wastewater Treatment Division, Port of Seattle, Washington State Department of Ecology, Washington State Department of Natural Resources, Washington State Department of Fish and Wildlife, Washington State Department of Transportation, US Environmental Protection Agency, and the US Army Corps of Engineers. Due to limited staffing resources, LUAT did not meet in 2005.

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University of Washington Center for Water Resources

Seattle Public Utilities is a participant on the Advisory Panel for the Center for Water Resources, formally known as the Center for Water and Watershed Studies (CWWS). SPU

continues to provide support to CWWS related to surface water runoff issues. The mission of the group is to conduct research, education, and information transfer about regional watershed studies encompassing diverse aquatic and human environments. The CWWS is a source of comprehensive aquatic resources and water management information to maintain and enhance the earth's watersheds. The research of the Center provides models for addressing both regional and global watershed issues, bringing together science and policy studies for publication and for discussion in courses, seminars, and workshops. CWWS is a broad, collaborative community of environmental scholars, achieving its goals through research, education, and information transfer.

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Local Hazardous Waste Management Program

SPU participates as one of five partners in implementing the regional Local Hazardous Waste Management Program (LHWMP) in King County. This interagency partnership oversees the management of a long-term plan to reduce the use of and manage disposal of hazardous waste. The partnership consists of the City of Seattle, Water and Land Resources and Solid Waste divisions of King County's Department of Natural Resources and Parks, the Seattle-King County Public Health Department, and the Suburban Cities Association.

On behalf of the City of Seattle, SPU provides staffing to coordinate Household Hazardous Waste (HHW) education and collection programs as part of the LHWMP, to represent the City on interagency committees and workgroups, and to help develop strategic policy, planning and budget proposals in support of City of Seattle, SPU, and LHWMP goals. Results for 2005 and the first half of 2006 include:

- LHWMP received a fee increase in order to continue to provide the current level of service to residents and businesses throughout King County.
- The Management Coordinating Committee (MCC) approved funding to continue the Green Gardening, Natural Yardcare, Natural Lawn and Garden Care Hotline, and Environmental Justice Network in Action (EJNA) programs.
- In conjunction with the Natural Yardcare Neighborhood program, a series of workshops were implemented in Piper's and Longfellow creek watersheds (2005) and in Thornton Creek watershed (2006).
- The ReUse Store formally opened to the public (April 2006). The Store provides *select* products to the public and non-profit agencies in King County free-of-charge. The products, which include latex and oil-based paint, wood care, cleaning, and automotive products, have been turned into a household hazardous waste collection facility. Reusing these products keeps the materials out of the waste stream, saves money, and reduces the need to generate new substances.

Julie Vorhes (206) 615-0027

Watershed Resource Inventory Area (WRIA) Coordination

The City of Seattle continues to be actively involved in Watershed Resource Inventory Area (WRIA) salmon habitat conservation efforts. The jurisdiction of the city of Seattle is contained in WRIA 8 (Cedar/Lake Washington) and WRIA 9 (Green/Duwamish). Owing to municipal operations in other areas outside the city’s limits, Seattle is also active in WRIA 7 (Tolt/Snohomish), WRIAs 3 & 4 (Lower & Upper Skagit), and WRIA 62 (Pend Orielle). SPU has

two senior-level WRIA coordinators (WRIA 8 & 9), and Seattle City Light has allocated staff to WRIAs 3/4, 7 and 62. WRIA salmon conservation efforts work to build inter-jurisdictional coalitions and partnerships that integrate citywide efforts within each WRIA. The WRIA Forums have focused planning agendas on developing baseline salmon habitat assessments and recovery plans, which have included identifying watershed-wide informational needs and limiting factors to salmon recovery. In February 2002, WRIA 8 produced a Draft Near-Term Action Agenda for Salmon Habitat Conservation, and in May 2002, WRIA 9 issued its final Near-Term Action Agenda for Salmon Habitat Conservation. WRIA 7 produced a Near-Term Action Agenda in December 2001. These documents are the product of over a year of collaborative discussions among elected officials, jurisdictional staff, business and environmental groups, scientists, and concerned citizens. They were intended to provide guidance to local governments and interested organizations and citizens on interim measures that can be undertaken in the near-term while longer-term conservation plans were being developed.

WRIAs 7, 8 and 9 have now completed their strategic assessments and their Chinook salmon habitat conservation plans have been completed and adopted by the participating jurisdictions. WRIA 8 used an ecosystem model, Ecosystem Diagnosis and Treatment (EDT), to assess historic and current habitat conditions in the Lake Washington basin. Modeling results were used in conjunction with Chinook salmon distribution and an analysis of current land use patterns in the basin to develop a set of recommendations for site specific habitat protection and restoration projects. In 2006, WRIA 8 will continue using EDT to evaluate the relative benefits of different suites of actions for recovery of Chinook runs. WRIA 9 has completed assessing both current and historic habitat conditions to provide insight for developing their salmon recovery projects. Close coordination with the Puget Sound Nearshore Ecosystem Restoration Project has allowed the WRIA to place emphasis on marine nearshore habitats, in addition to the freshwater ecosystem. WRIA 3/4 revised its strategic plan for prioritizing recovery projects to emphasize ESA listed species: chinook salmon and bull trout. Recovery efforts in the Skagit watershed are currently focusing on estuary and nearshore areas, with a number of cooperative scientific studies identifying the importance of these areas to chinook salmon and bull trout. WRIA 3/4 completed an analysis of long-term restoration approaches for salmon habitat in the Skagit delta and estuary. WRIA 7 developed an Ecological Analysis for Salmonid Conservation (EASC) as a collaborative effort between its technical committee and the Puget Sound Technical Recovery Team for Chinook salmon. The EASC employed EDT and a separate model called Shiraz to categorize sub-basins for their importance to habitat and devise individual protection and recovery strategies.

WRIA 8 developed a comprehensive habitat plan for the Lake Washington basin, including recommended site-specific habitat protection and restoration projects, land use actions and public outreach/stewardship initiatives. A draft plan underwent review and refinement by the WRIA 8 planning bodies. Public review of the document began in November 2004, and a final plan was available in May 2005. WRIA 9 developed recovery actions during 2004 and completed its habitat plan in mid-2005. WRIA 7 approved its Draft Snohomish River Basin Salmon Conservation Plan in July 2004, triggering a public and agency review period with final plan approval in June 2005. Each of these WRIAs is now transitioning from planning work to implementation of their plans. Interlocal agreements to fund joint staffing to coordinate the implementation work are being negotiated in 2006.

Additional information for WRIAs 8 and 9 can be found at:

http://dnr.metrokc.gov/WRIAS

Additional information for WRIA 7 can be found at:

http://dnr.metrokc.gov/wrias/7/Index.htm

http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Services/Salmon/

Jean White, WRIAs 8&9 (206) 684-5185; Scott Powell, WRIA 7 (206) 386-4582; Ed Connor, WRIAs 3&4 (206) 615-1128

Watershed Forums

Seattle's elected officials and staff have participated in local Watershed Forums since their inception several years ago. These Forums were initially formed as an outgrowth of the Regional Needs Assessment for surface water management and were originally tasked to address surface water management needs, including flooding and water quality. The Forums were later expanded to also address salmon and related habitat issues, and in 2001 they were formally aligned with the WRIA planning processes. In 2005, WRIA salmon habitat conservation plans were finalized and adopted by the participating jurisdictions. In 2006, the Watershed Forums are reconfiguring themselves to move from planning to plan implementation. The purpose of these Forums is to:

- Implement the adopted WRIA salmon habitat conservation plans and provide direction for joint efforts to recover salmon habitat.
- Provide an opportunity for all local governments that share the watershed to discuss salmon habitat and water quality issues.
- Allocate King Conservation District funds to salmon habitat projects and activities important to the entire WRIA.
- Seek funding to implement the adopted WRIA salmon habitat conservation plans and track progress in plan implementation using adaptive management to redirect implementation actions as needed.
- Provide oversight for the jointly funded staff working on salmon habitat conservation.

The boundaries of Seattle lie within the Lake Washington/Cedar/Sammamish Forum (WRIA 8) and the Green/Duwamish Watershed Forum (WRIA 9). The City of Seattle also participates in the Skagit Watershed (WRIA 3 / 4) due to Seattle City Light's power facilities there and the Snohomish Watershed Forum (WRIA 7) due to Seattle Public Utilities' drinking water facilities in the Tolt Watershed.

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Lower Duwamish River Sediment Cleanup and Restoration

The City is continuing to participate in a Remedial Investigation of the Lower Duwamish in partnership with King County, the Port of Seattle, and Boeing. This work is being done under an Administrative Order on Consent (AOC) from EPA and Ecology under the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) and the Washington State Model Toxics Control Act (MTCA). Phase I of the Remedial Investigation (RI) has been completed, resulting in the identification of eight candidate sites for early cleanup action. SPU is also a member of the multi-jurisdictional Elliott Bay/Duwamish Restoration Panel (EBDRP), which was created as a result of a consent order

settling Natural Resource Damages claims. EBDRP includes representatives from NOAA, US Fish and Wildlife Service (USFWS), the Muckleshoot and Suquamish tribes, the Department of Ecology, King County and the City of Seattle. It prioritizes and funds clean up and restoration projects on the Duwamish River using City and County funds contributed as part of the settlement. It has funded a clean-up project at the Norfolk site and at the Diagonal/Duwamish site. Habitat projects include habitat restoration at the Seaboard Lumber site and other locations. Currently, the RI, phase II, is on schedule for completion in the first half 2008, with the Feasibility Study (FS) following in late 2008, and Record of Decision in 2009. While the RI and FS are being completed, several early action cleanups will occur – Slip 4 in 2007, T117 in 2008. Source control activities for each early action sites are being competed as well, and river-wide source control activities are on-going. Finally, the City is engaged with King County, Tacoma, EPA and Ecology in a collaborative effort to investigate the source problems associated with Phthalates (BIS), current knowledge of human and ecological risks associated with BIS, and potential solutions in on the ground activities and regulatory response, whether at a state or national level.

Martin Baker (206) 684-5984

3.3 REGULATIONS & TECHNICAL STANDARDS

3.3.1 Stormwater, Grading and Drainage Control Code and Directors' Rules

The City revised its Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 - 22.808) in July 2000. Also updated were the associated Director's Rules for Flow Control, Stormwater Treatment, Source Control, and Construction Stormwater Management. The Stormwater Code and Directors' Rules can be viewed on the City's Website:

http://www.ci.seattle.wa.us/dclu/Codes/sgdccode.htm

Seattle Public Utilities (SPU), working in close collaboration with the Department of Planning and Development (DPD) and other City Departments, has embarked on a project to update the Stormwater Code and Directors' Rules. This effort will produce a suite of minimum requirements and technical standards that are equivalent with Ecology's *Stormwater Management Manual for Western Washington* (February 2005). The scope of the project also includes incorporating non-structural preventive actions, low impact development techniques, and natural drainage system designs. The goal of the Stormwater Code Revision Project is to develop a revised set of technical standards and code requirements that accounts for Seattle's built-out environment and development patterns while, at the same time, retaining equivalency with Ecology's guidelines.

Robert Chandler (206) 386-4576

3.3.2 Side Sewer Code

Seattle Municipal Code 21.16, the Side Sewer Code, prohibits certain discharges into the City's public sewer system, drain, ditch, or natural outlet. Included in the list of prohibited discharges are: fats, oils, grease, high temperature liquids, flammables and oils, toxic and poisonous substances, garbage, sand, and mud.

Integrated with the project to revise Seattle's Stormwater Code, SPU is currently leading an interdepartmental initiative to revise the Side Sewer Code. The new Side Sewer Code will incorporate changes in the Stormwater Code as well as clarify requirements and technical

standards for both side sewers and service drains.

Robert Chandler (206) 386-4576

3.4 PERMITTING, INSPECTIONS & ENFORCEMENT

3.4.1 Drainage Plans and Permit Approval

Development permits are issued by the City of Seattle's Department of Planning and Development (DPD). The DPD Site Development team (SD) is responsible for Drainage and Environmentally Critical Area project review along with corresponding on-site inspections.

Pre-Application Site Visit (PASV) inspections for all proposed construction projects (prior to an applicant's submittal of development plans) where the existing ground condition or vegetation will be disturbed are performed by the site inspectors. These PASVs are generally done within 48 hours of DPD receiving a PASV and Addressing Application. These site visits are designed to provide photo documentation and to verify on-site conditions, including: topography, significant vegetation, environmental impacts, specific concerns, and the types of special reports needed (topographic survey, wetlands, soils report, etc) for permit submittal. The SD team also assists land use and code enforcement staff with site issues, and provides site review for building and grading permit applications, short plats, Master Use Permits, complaints and violations.

Each DPD SD Inspector has attended a two-day Department of Ecology Temporary Erosion and Sediment Control (TESC) certification class. In 2005, the SD team held two three-hour DPD TESC workshops for developers, consultants and contractors who are doing development projects located within the City. SD staff also has created a sample TESC standard plan and details that can be used for smaller projects. In 2005, DPD also initiated a temporary dewatering permit for construction sites that requires the discharge of collected surface and subsurface water to public infrastructure.

A special concern of the SD team is site construction activity that occurs within Environmentally Critical Areas (ECAs), shorelines and within the drainage basins of the City's five major creeks. The Drainage and Sewer Desk of DPD is staffed by senior civil engineering specialists to provide technical advice and review on TESC, grading, side sewer and drainage components of construction projects. DPD SD Inspectors complete approximately 60 TESC inspections weekly. Approximately 200 additional inspections are completed weekly. These inspections include side sewer construction (including service drains) inspections, PASV's, preconstruction meetings, monitoring of on-going sites and complaint dispatches

Sherell Ehlers (206) 615-0040

3.4.2 Water Quality Complaints

SPU Environmental Compliance Inspectors respond to water quality complaints within Seattle City limits. The City provides a 24 hour hotline and web form for reporting complaints and also receives complaints directly from other departments and agencies. Inspectors respond to the complaint, locate the source and the responsible party, provide technical assistance and education on best management practices for pollution prevention and education on relevant Seattle codes and clean up the problem when necessary. Complainants are notified of investigation results. SPU water quality inspectors received 336 surface water quality

complaints in 2005. A summary of the water quality complaints received during 2005 are provided in Table 1.

Table 1. Summary of Water Quality Complaints

Type of Material	Number of Complaints	Percentage of Total
Automotive Fluid	54	16%
Sewage	22	6%
Soap	16	5%
Miscellaneous	80	24%
Construction	51	15%
Debris	17	5%
Grease	9	3%
Oil	42	13%
Paint	16	5%
Other	28	8%

Of the 366 complaints, 263 were resolved (i.e., the source of the pollution was found and stopped). A major illicit connection into Lake Union was located in December 2005. A Notice of Violation was issued and a cost recovery was done to recoup investigation costs.

A new database is currently under development, which will allow for more complete entry, tracking and analysis of the complaints that are received. The database is expected to be completed by late 2006 - early 2007.

Ellen Stewart (206) 615-0023

3.4.3 Business Inspection Program

The goal of the Business Inspection Program is to reduce and/or prevent stormwater pollution by inspecting businesses and requiring that they are implementing best management practices in accordance with the City's Stormwater, Grading and Drainage Control Code. All businesses are required to maintain onsite drainage control systems and identify and remove illicit connections to the public storm drain system. Inspectors use a list of HRPGA (high-risk pollution generating activities) to determine business site activities that require additional operational source control requirements. All businesses that engage in one or more HRPGA's are required to implement applicable operational source controls and implement spill prevention plans. In 2005, inspections were conducted in the Thornton and Lower Duwamish (Superfund) drainage basins. There were a total of 258 full onsite inspections, most of which required corrective actions. The most common problems found during business inspections included catch basins full of sediment and incomplete and/or missing spill prevention plans and spill kits. The number of businesses requiring corrective actions in 2005 is presented in Table 2.

Table 2. Corrective Actions Required

Corrective Action	# Businesses
Clean and eliminate leaks and spills from storage areas	19
Correct illegal plumbing connection	4
Discontinue discharging washwater or process wastewater to storm drain	31
Implement proper housekeeping activities	25
Implement proper washing practices	16
Improve or create spill response procedures	180
Improve or purchase adequate spill response materials	149
Make storm drain facility parts accessible	4
Replace/repair missing or damaged components of storm drain facility	54
Properly educate employees	145
Properly perform vehicle and equipment maintenance	6
Properly store containerized materials	12
Properly store non-containerized materials	9
Clean storm drain facility	105

When corrective actions are required, Inspectors conduct re-inspections to ensure that the Code requirements are implemented. Four Notice of Violation were issued to Seattle businesses that were negligent in implementing the required correction actions. The Notice of Violations resulted in compliance from the businesses.

In addition to the full inspections, there were 40 screening inspections done. A screening inspection indicates that an Inspector spoke with a manager or owner but determined that there were no high risk pollution generating activities occurring onsite.

Ellen Stewart (206) 615-0023

3.4.4 SPU Environmental Compliance Audit Programs

Since 2000, SPU has conducted Environmental Compliance Audits at 14 facilities on a 2-year cycle. Each facility will have been audited three times by the end of 2006. In 2002, the Audit Team also conducted site visits at 64 SPU facilities (e.g., reservoirs, pump stations, Materials Lab, etc.) to provide a quick check for possible environmental exposures at "less-than-major" facilities and to screen for any other facilities that might merit formal environmental compliance audits. The Team found relatively few problems to be corrected and confirmed the original list of facilities that need to receive full audits.

The Audit Team uses a set of audit protocols covering eight major regulatory areas (e.g., Resource Conservation and Recovery Act (RCRA), Superfund Amendment Reauthorization Act (SARA) Title III, Clean Air Act, Clean Water Act, etc.) as well as certain safety regulations and the Uniform Fire Code that overlap significantly with hazardous materials or hazardous waste areas of concern. Audits include inspections of outdoor storage areas, examination of oil/water separators and storm water inlets, and assessment of facility spill prevention and response plans. Seven facilities were audited in 2005; seven facilities are being audited during April-August 2006.

John Labadie (206) 684-8311

3.4.5 Drainage System Inspection Program

In 2005, 97drainage system inspections were completed. Inspections focus primarily on multi-family dwellings, commercial, and industrial properties. A summary of the types and frequency of problems found in 2005 is presented in Table 3.

Table 3. Drainage System Problems

Problem	# Times
Orifice plate is plugged	1
Detention system sump or pipe has excessive sediment accumulation	3
Maintenance hole or flow control device has structural defects	3
Catch basin(s) has excessive sediment accumulation	10
Missing or damaged components to flow control system need replacement/repair	12
Cannot access the flow control maintenance hole (buried, stuck, inaccessible)	3
Missing or damaged components to catch basin need replacement/repair	9
Detention system has illicit connection	1
Miscellaneous	2

Of the 97 sites inspected in 2005, approximately 35 were in need of some level of maintenance or repair. Removal of sediment from flow control structures and/or onsite catch basins was the most common maintenance need. Other common compliance issues include catch basins missing outlet traps, and missing, broken, or plugged flow control devices. Technical assistance is provided to property owners when they are informed of maintenance deficiencies and re-inspections are conducted to ensure that the maintenance is completed in a timely manner. Two Notices of Violations were issues to property owners who did not complete their maintenance in a timely manner. Through the Drainage System Inspection Program, one illicit connection was found in 2005.

Ellen Stewart (206) 615-0023, Louise Kulzer (206) 733-9162

3.4.6 Pollution Prevention Activities

In late 2004 and 2005, the Surface Water Quality Team developed, implemented and evaluated a Spill Kit Incentive Pilot Program (SKIPP). Seattle's stormwater discharges are regulated by the Seattle Stormwater, Grading and Drainage Control Code (SMC 22.800), which targets eight High Risk Pollution Generating Activities (HRPGA). Any Seattle business involved in one or more of these eight activities are required to have a spill prevention plan and spill cleanup kit on-site. Inspection data confirms that the most requested corrective action is to implement a spill plan and have a spill kit on hand. The SKIPP program goals were to:

1. Increase the presence and use of spill kits among people who engage in activities that could result in pollutants entering storm drains or water bodies;
2. Reduce the likelihood of spilled pollutants getting into receiving waters; and
3. Increase awareness that the storm drains are connected to receiving waters and that how businesses conduct activities, especially pollution-generating ones, can make a difference in surface water quality.

Over 550 businesses participated in the SKIPP program in 2005, which was advertised through direct mail, workshops, inspections, door to door visits and through minority community outreach groups. To qualify for a free spill kit, businesses first completed a spill plan either online or via a hard copy. Once the spill plan was reviewed, the spill kit, the laminated spill plan and a site map showing where their drains discharged was delivered by an ECOSS (Environmental Coalition of South Seattle) staff member who also provided relevant education and technical assistance (if necessary). A survey was done to assess the effectiveness of the program and results showed:

- Participants (68%) are significantly more likely than non-participants (41%) to indicate they put down spill materials to soak up spills.
- Participants are significantly more likely than non-participants to report they know where water and spills in their storm drain go (81% compared to 55%, respectively).
- Respondents who were visited by a SPU inspector (83%) are significantly more likely than those who were not (57%) to indicate they know where their storm drains ultimately discharge.

SPU is currently further analyzing results, in hopes of making the program a permanent offering to Seattle businesses.

Louise Kulzer (206) 733-9162

3.4.7 Lower Duwamish Waterway Source Control Program

Source control activities to support the Lower Duwamish Waterway (LDW) Superfund remedial investigation/feasibility study continued during this reporting period. The Lower Duwamish Waterway (LDW) was listed as a federal Superfund site in 2001 because of contaminated waterway sediments. The purpose of the source control program, which includes business inspections and pollutant source tracing, is to reduce the potential for sediments to recontaminate following cleanup. SPU and King County are working with businesses in the area to reduce the amount of pollutants currently discharged to the waterway via storm drains and combined sewer overflows (CSOs). Inspection efforts are focusing on areas that have been identified as high priorities for cleanup based on the results of human health and ecological risk assessments. Inspections are comprehensive, covering stormwater pollution prevention, hazardous waste management, and industrial waste disposal issues. Source tracing involves collecting sediment samples from catch basins, inline maintenance holes, and inline sediment trap to characterize the quality of sediment at various locations in the drainage system.

SPU and King County submit progress reports every six months to EPA and Ecology on the source control program (reports submitted in January 2005 and July 2005). The LDW source control program is expected to continue through the next NPDES reporting period. Following is a brief summary of work completed during this reporting period (January 2005 through June 2006):

- Inspections in 2005 continued in the Diagonal Ave S CSO/SD basin and expanded into the Slip 4 early action area, as well as the Slip 5/6 drainage basins, and the Glacier Bay area. Inspectors from SPU and King County Industrial Waste completed 107 inspections (102 full inspections and 5 screening inspections) in the Lower Duwamish. In addition, inspectors conducted 108 follow-up inspections to confirm that corrective actions requested during earlier inspections had been implemented.

- Inspectors also continued working in the areas draining to the East Waterway. Although not part of the Lower Duwamish Waterway site, the East Waterway is undergoing cleanup by the Port of Seattle. SPU and King County are providing source control support to the Port for this effort. Inspectors completed 438 inspections (192 full, 61 screening inspections, and 185 follow-up inspections) in the East Waterway.

- Sediment samples were collected from 46 onsite catch basins and 13 catch basins in streets/roadways in storm drains discharging to the Lower Duwamish Waterway. In addition, three rounds of sediment trap samples were collected from the 6 sediment traps installed in the Diagonal Ave S CSO/SD basin (August 2004-March 2005, March 2005-August 2005, August 2005-March 2006).

- In March 2005, SPU also installed sediment traps at 10 locations in the storm drains discharging to Slip 4. Two rounds of samples have been collected. The Boeing Company and SPU are sharing the sediment trap removal/deployment activities.

- In November 2005, SPU completed additional PCB-cleanup in the right-of-way in the South Park neighborhood to protect public health. Work involved sweeping streets along S Cloverdale St, S Donovan St, and 16th Ave S and cleaning catch basins to remove PCB-contaminated material. Work also continued on developing the final cleanup plan to remove the remaining PCB-contaminated soil in the right-of-way that was covered in 2004-2005. SPU is coordinating the right-of-way cleanup with Port cleanup activities on Terminal 117.

Beth Schmoyer (206) 386-1199

3.5 STORMWATER POLLUTION PREVENTION

3.5.1 Household Hazardous Waste Program

The Household Hazardous Waste (HHW) Education program is a multi-faceted approach to educating the public, including the under-served community, about the proper use, storage, re-use and disposal of hazardous household products and about the availability of less toxic alternatives. Product stewardship initiatives are a growing part of this work.

Julie Vorhes (206) 615-0027

Green Home Kit Program

This program produces and distributes Green Cleaning Kits and Green Cleaning information primarily in the form of Green Cleaning Recipe Cards. The program also conducts New Parent Workshops that use these kits to help established parent training groups that learn about a broad range of hazardous household chemicals and healthful alternatives to these chemicals. In addition, the Green Home Kits have been used as outreach tools at community festivals and by community-based organizations serving recent immigrant and refugee populations. In most cases, recipients of the kits are directed to use them as a means to begin an educational process about hazardous household chemicals that encompasses the more dangerous groups of cleaners. Among the accomplishments for 2005:

- Distributed 2047 Kits and over 10,000 recipe cards.

- More than 45 HHW presentations were done by other agencies (King County DNR & Solid Waste) for teachers, youth, and new parents using green home kits.

- Integrated Environmental Coalition of South Seattle (ECOSS) outreach team into Environmental Justice Environmental Justice Network in Action project. Team did 40 presentations for the following language groups: Spanish, Vietnamese, Somali, Amharic and Cantonese speaking communities.
- Translated HHW disposal flier into eight languages.

Michael Davis (206) 615-1376

The Eco Home

The Eco Home is a collaboration between Seattle Public Utilities, Seattle City Light, Seattle Tilth, the International District Housing Alliance (IDHA), King County Public Health, and King County DNR. The program is designed to educate festival attendees using hands on activities showing what they can do in their home, yard, garden, and community to protect the health of their family and the environment and save money. Agency staff and trained community volunteers were on hand to engage the public and answer questions. Among the accomplishments in 2005:

- Eco Home display at two community events: International District Street Fair and White Center Jubilee Days.
- Youth from IDHA's Wilderness and Inner-city Leadership Development (WILD) participated in all parts of ID Street Fair display, provided translation, did surveys, etc. US Forest Service put together display to education festival goers about watersheds.
- Community members participating in Environmental Justice Network in Action project set up info booths on household hazardous waste, water quality and recycling at 13 community festivals.
- Seattle Public Utilities' Recyclettes provided information on recycling program and had information available in English, Chinese, Spanish, Vietnamese, Amharic, Somali, Tegrinia, and Khmer.

Michael Davis (206) 615-1376

3.5.2 Storm Drain Stenciling

- The purpose of SPU's Storm Drain Stenciling Program is to educate the general public about pollution prevention and reduce pollution in the storm system. SPU provides storm drain stenciling and oil spill kits for community and business volunteers. During 2005, 4,629 storm drains were stenciled. In the first half of 2006, 2,350 storm drains were stenciled

Carlton Stinson (206) 684-7624

3.5.3 Mutt Mitt Program

This program is designed to keep pet waste out of the drainage system and promote the message that pet waste affects water quality. Sixteen Mutt Mitt dispensers, each with 200 mutt mitts (plastic bags), have been installed in Seattle since September 2005. To date over 6,000 mutt mitts have been dispensed.

Carlton Stinson (206) 684-7624

3.5.4 Resource Venture

SPU contracts with the Resource Venture to increase sustainability awareness and Code compliance with the Seattle business community. The Resource Venture contract is currently being implemented by Cascadia Consulting and provides free information, education, and technical assistance to help Seattle businesses improve all conservation practices. Their stormwater assistance, provided by ECOSS (The Environmental Coalition of South Seattle) and Herrera Consulting, focuses on providing site-specific assistance for businesses needing non-standard approaches to pollution prevention. The Resource Venture and ECOSS reach businesses through newsletters, trade publications, community presentations, workshops and phone and web resources. In 2005, additional time and resources were devoted to assisting SPU in the implementation of a Spill Kit incentive pilot program, which provides free spill kits and spill plans to help Seattle businesses prepare for a spill.

Ellen Stewart (206) 615-0023

3.5.5 Hazardous Material Inventory

As a result of the Hazard Communication business process redesign, SPU revitalized its annual Hazmat Inventory in 2005. The new inventory is designed to capture additional information from the SPU users about processes involving the use of priority products (products that pose significant risk to human health and the environment), the product's physical characteristics, and the usage history. The inventory forms the basis for developing employee communications and training on safe use procedures, efficient management of stocks on hand, and for regular upkeep and removal of unused, outdated, or surplus chemicals that otherwise could end up in the environment.

In 2006, SPU continued its efforts in the Toxics Reduction/MSDS Ranking project utilizing inventory data and priority product (products that pose significant risk to human health and the environment) utilization information gathered in the 2005 Annual Hazardous Material Inventory. The detailed inventory information was analyzed and several categories of hazardous products were selected for process and product substitution. SPU staff are expected to update the site-specific Hazardous Material Inventory anytime a new product is introduced. An annual Department-wide inventory is not currently scheduled for 2006.

Shab Zand (206) 233-5172

3.5.6 Hazardous Material Reduction

In 2005, SPU launched the MSDS/Product Ranking and Toxics Reduction project. The Toxics Reduction/MSDS Ranking project has resulted in selection of several categories of priority products (lubricants, solvents and cleaners) and product ingredients targeted for phase-out and substitution. We developed product ranking criteria, evaluation tools and a process for assessment and ranking of existing and new products. Several SPU facilities were selected for the priority product review process.

In 2006, we began pilot testing several bio-based (canola oil-based) lubricants as substitutes for chlorinated hydrocarbon lubricants in various SPU field operations. The results of the pilot testing, if effective, will form the basis for permanent replacement of several highly toxic products in SPU workplaces. Approved product lists will also be developed along with purchasing controls to limit future use of toxic products.

SPU no longer conducts product round-ups and exchanges due to other resource and time

demands.

Shab Zand (206) 233-5172

3.5.7 Natural Lawn and Garden Care Campaign/Natural Soil Building

In recent years SPU has begun offering a series of education programs for architects, designers, landscape architects, planners, engineers, and builders on stormwater BMPs and Low Impact Development/Natural Drainage System techniques. In 2005 these classes were attended by 1580 building professionals; in the first two quarters of 2006 they reached 930 professionals. These training opportunities have created a network of informed designers and builders, who both reduce stormwater runoff quantity and improve water quality long-term through better landscape maintenance practices and lower chemical use. SPU again co-sponsored "Stormwater: Turning a Potential Problem into an Asset", this time offering two follow-up day-long seminars that were more specific and had full attendance.

In 2005-6, the Natural Lawn and Garden Care Campaign continued with distribution of the "Naturals" brochures to nurseries and community events throughout King County. Over 90,000 brochures were distributed in 2005. In 2005 and the first half of 2006, there were over 6,100 pesticide reduction-related questions answered by Hotline staff. Overall, the Hotline answered over 16,000 questions related to environment-friendly yard care.

Once again, SPU participated in Northwest Natural Yard Days with other regional agencies in 2005 and 2006. In the spring of 2006 the campaign incorporated even more retailers, with a total of 78 retail locations in the Puget Sound Region. The program sold a broad range of environmentally-sound products including electric mulching mowers, push mowers, organic fertilizer, insecticidal soap (alternative to pesticide), hand weeding tools, water timers, soaker hoses, compost and bark mulch. In 2004, the program transitioned to a seasonal format with sales in both Spring and Fall. In the Puget Sound Region, over 337,500 products were sold during the spring and fall of 2005 and the spring of 2006.

During 2005 and the spring of 2006, the Natural Soil Building Program sold over 3,000 food waste composters and over 1,400 yard waste composters to Seattle residents.

In 2005 and the first half of 2006, SPU conducted Natural Yard Care Neighborhood outreach in six new neighborhoods. The response was once again very positive. A series of six classes over three evenings was presented in each neighborhood, plus a fall follow-up class was presented to the three 2005 neighborhoods. As part of this effort, 524 residents (255 in 2005, 269 in 2006) attended one or more evenings of natural yard care training. Evaluations conducted in Fall 2003 and 2004 indicated a high degree of attitude and behavior change and a persistence of most of the key behavior changes. A new longitudinal survey evaluation will be done in the fall of 2006 for 2005 participants.

Carl Woestwin (206) 684-4684

3.5.8 Green Gardening Program

Since January 2004, the Green Gardening Program contract has been carried out by Cascadia Consulting Group. The program has been managed by SPU and funded by the Local Hazardous Waste Management Program (LHWMP) since 1993 with the goal of educating King County residents and landscape professionals about alternative pest management strategies in an effort to reduce pesticide use. Among the accomplishments for 2005:

- Reached 686 individuals through 32 presentations, with over 70% of the presentations taking place in King County outside Seattle.
- Piloted a "home garden party" at three homes, where residents invited people to their homes for a walk-around garden tour and presentation by an IPM expert.
- Created a new interactive presentation – "Painless Pest Prevention" – designed for non-English speaking audiences, and piloted it with Chinese and Korean speaking gardeners.
- Presented a food garden pest management workshop for Chinese and Korean gardeners at the Danny Woo Gardens. This presentation was featured in an article on the front page of the Local Section of the Seattle Times.
- Trained 163 nursery staff through on-site trainings and incorporated a practical, interactive role playing activity. The activity entailed staff discussing possible answers to customer questions about pests and plant health.
- Conducted a "Help your nursery make healthy profits" training at Swansons Nursery with Ann Lovejoy, Steve Minch (Bainbridge Gardens manager), and Swansons staff.
- Presented five IPM sessions at each of the three horticultural schools, reaching 152 students.
- Reached 201 landscape professionals through a full-day workshop designed to reach public groundskeepers and private landscapers, as well as others in the landscaping industry. The workshop was held at South Seattle Community College in collaboration with the horticulture and continuing education departments. As part of this workshop a 3 hour Spanish language only training was presented on fertilizer application.

During the first half of 2006, the program:

- Reached 224 people in nine home gardener presentations.
- Conducted six on-site nursery trainings, reaching 73 nursery staff.
- Presented IPM topics to 56 horticulture school students in two classrooms
- Prepared IPM information on nurseries, non-toxic gardening products, IPM / organics-oriented landscaping businesses, and how to choose a landscape contractor and put it up on the www.savingwater.org website. "Pitched" the story to local media and got three stories published, including a long, excellent article in the *Seattle P-I* (see http://seattlepi.nwsource.com/business/276099_retail01.html)

Participant ratings of presentations and trainings were similar in 2005 to ratings reported in 2004. There was a slight increase in average ratings for public presentations, horticulture classes, and the Swansons Nursery Event (compared to the Bainbridge Gardens Event in 2004), but these increases are not likely statistically significant. The IPM Workshop also received relatively higher ratings when compared to an average of ratings from both the 2004 Groundskeeper and Landscaper workshops. Retail Nursery Training ratings decreased in 2005, possibly due to the topic of general IPM, since some seasoned nursery staff felt the presentations did not have enough new information.

Carl Woestwin (206) 684-4684

3.5.9 Pesticide Reduction

Seattle's pesticide reduction efforts are part of the City's Environmental Action Agenda, the City's strategy for protecting environmental quality, promoting environmental justice, and improving quality-of-life in Seattle for current and future generations. The Seattle Environmental Management Program (EMP) was adopted as a methodology for achieving the City's environmental goals within our operations. The EMP contains policies and procedures for moving us toward those goals. The EMP Chemical Use Policy establishes a framework for evaluating potentially hazardous materials and prioritizing products for phase out and replacement with less hazardous alternatives. Pesticides were the first product group addressed under the policy because they are potentially hazardous chemicals intentionally placed directly into the environment.

The two main goals of the Pesticide Reduction Program are (1) to eliminate the use of the most potentially hazardous herbicides and insecticides by City operations and (2) to achieve a 30 percent reduction in overall pesticide use by City operations. Employee-driven innovations have resulted eliminating use of most Tier 1 insecticides and herbicides and significantly reducing overall pesticide use. Citywide pesticide use was reduced from the annual average baseline (1995-1999) by 16% in 2003, 28% in 2004[1]. Data was no longer centrally tracked for all departments in 2005. Notable achievements in 2005 include:

- For general Parks Department operations (not including city-owned golf courses), pesticide use declined from the 1995-1999 average by 80% in 2005.
- On golf courses, pesticide use decreased 21% from the 1995-1999 average in 2005. A target has been established to achieve a 30% reduction by 2008.
- Total Parks Department use (non-golf and golf use) declined 34% from the 1995-1999 baseline.
- In 2005, Seattle City Light reduced use by 53% and the Seattle Libraries reduced use 37% from the 1995-1998 annual average baseline for these departments.

Additional information on Seattle's Pesticide Reduction Program is available at:

http://seattle.gov/environment/pesticides.htm
http://www.ci.seattle.wa.us/parks/horticulture/pesticide.htm

Barb Decaro (206) 615-1660, Tracy Morgenstern (206) 386-4595

3.5.10 Pesticide Free Parks

In 2001, Seattle Parks and Recreation and the Office of Sustainability and Environment designated fourteen Seattle park locations as Pesticide-Free Parks (PFPs). These locations have been maintained without the use of pesticides, providing City staff with the opportunity to better understand options for caring for lands with less reliance on pesticides and providing the community the opportunity to enjoy parks managed without pesticides. In 2004, Seattle Parks completed an expansion program plan to provide a greater geographic distribution and neighborhood availability of Pesticide-free Parks throughout the City. As a result of the expansion program, eight additional Pesticide-free Parks were added in July 2006 for a total of

[1] These numbers represent pesticide use for Seattle City Light, Seattle Public Library, Seattle Parks and Recreation, and the Seattle Center; data for the Seattle Department of Transportation and Seattle Public Utilities were not available.

22 PFPs citywide.

Barb Decaro (206) 615-1660

3.6 PUBLIC INVOLVEMENT, EDUCATION, STEWARDSHIP.

Pollution prevention activities conducted by SPU include public involvement, education, and stewardship programs are described below.

3.6.1 Creeks, Drainage, and Wastewater Citizen Advisory Committee

Seattle Public Utilities sponsors several Citizen Advisory Committees. The advisory committee most involved with stormwater-related issues is the Creeks, Drainage and Wastewater Citizen Advisory Committee (CDWAC) which has 15 members that represent different Seattle communities. This committee sets its own work plan and operating procedures with input from staff. Decision-makers within SPU are regularly briefed on committee actions and input, and emphasis is placed department-wide on responding promptly to committee recommendations. The membership of this committee includes citizens with professional backgrounds in the subject area and representatives of relevant stakeholder groups to provide a diversity of viewpoints. In 2005, the committee made recommendations on the following: Comprehensive Drainage Plan, Comprehensive Wastewater Plan, Aquatic Resources & Water Quality Monitoring, Drainage Rates, and Critical Areas Ordinances.

Carlton Stinson (206) 684-7624

3.6.2 Environmental Education Team

Seattle Public Utilities education staff works in partnership with public and private schools and other city departments to provide programs that promote awareness and actions related to recycling, water conservation, hazardous waste removal, water pollution prevention and stream habitat protection. The following are accomplishments during 2005 and early 2006:

- Provided funding and materials to the Seattle School District for twelve teacher training workshops involving 92 teachers to integrate habitat protection, recycling and conservation messages into existing curricula.
- Provided urban watershed field trip transportation funding and naturalist services for 60 Seattle School grade 3 – 5 classes that promoted understanding of water quality and habitat protection.
- Provided storm drain stenciling materials and services to 48 Seattle public and private school groups to promote protection of water quality in Seattle's urban watersheds.
- Partnered with Seattle Parks and Recreation and the Seattle Department of Transportation to install 16 Mutt Mitt dispenser units in public spaces. The program promotes protection of local streams and waterways from fecal coliform pollution.

Mike Mercer (206) 684-0570

3.6.3 Seattle Schools Program

SPU supports the Seattle School District's water quality programs that deliver watershed pollution prevention messages. Among the accomplishments in 2005:

- Provided field trips for 72 Seattle schools;

- Sponsored transportation for 48 public schools; and
- Promoted annual Salmon Homecoming events (500 students)..

Carlton Stinson (206) 684-7624

3.6.4 Environmental Grant Funding

The Environmental Grant program provides funding support for community groups or schools to do one-time, short-term projects that protect, educate and involve communities in educating and protecting our natural resources with respect to water quality, solid waste, and litter and graffiti. During 2005, SPU was involved in funding the following projects:

- **Department of Neighborhoods, P-Patch**: P-Patches are supported annually by SPU to educate the community on a variety of water quality and conservation issues related to natural organic gardening. In 2005, P-Patch included classes that focused on the Hispanic community and East African immigrants. P-Patch also provided support for Green Roof demonstration projects at Marra Farms in northeast Seattle.
- **Maple Leaf Community Council:** The Maple Leaf community, in partnership with the Department of Neighborhoods, transformed a vacant site into a multi-use community garden and gathering place. SPU provided funds for drought tolerant plants and to improve drainage in the street right of way.
- **Dahl Playfield:** Friends of Dahl Playfield received funds to restore and protect a wetland area as part of a 14.5 acre open space plan. The group received additional help from the Norcliffe Foundation, Starbucks and King County Councilman Bob Ferguson's office. The group used the natural topography of the site to locate the play areas in high areas and replant the low lying areas for drainage and filtration of storm-water runoff. This forested wetland will become a significant feature of the park.
- **Schmitz Park Elementary:** The Schmitz Park PTSA received funds to turn a one-acre asphalt playground into a grass play area surrounded by gravel trails, native plants, irrigation system, and drainage improvements. The field will be surrounded with swales for natural drainage to reduce storm water runoff. The project is a collaboration between several community groups who will benefit form the new gathering space.
- **Seattle Public Schools (SPS):** SPU provides support for fourth and fifth graders in Seattle Public Schools to enhance Land & Water and Microworlds science units. The science units focus on water quality and habitat restoration in our local watersheds. The funding provided eight new Land & Water units and six refurbish materials for existing Microworld units, 15 hours training for 64 new teachers on Land & Water units, and 15 hours training for 60 new teachers on Microworlds.
- **Meadowbrook Detention Pond:** SPU's Meadowbrook Detention Pond is a natural area located in the Thornton Creek Watershed in Seattle. The site is linked to the Land & Water science unit program with SPS, which features real life examples of erosion, natural habitat, and water quality. SPU has provided informational signage throughout the pond to help students and the community understand and interpret the site amenities.
- **Puget Soundkeeper Alliance:** The Puget Soundkeeper Alliance (PSA) created a booklet to educate the public about ways to prevent stormwater prevention in daily activities and to encourage adoption of these activities by encouraging them to "Take the Pledge". PSA printed 3500 copies that were distributed by over 240 community groups.

- **North Seattle Community College, Homewaters Project:** SPU, North Seattle Community College (NSCC), and SPS have created a partnership to help students and the surrounding community to learn about water quality and the natural environment. It provides opportunities for students and teachers to investigate their local ecosystems, increase community awareness, and promote active involvement in local education and stewardship. In conjunction with the SPS science units, NSCC provides student with docent tours and study on Thornton Creek.
- **Watershed Field Trips:** SPU provided funding for 14 naturalist lead field trips to the Thornton Creek Watershed. This funding supports the schools outreach program for the environment through NSCC Homewaters program.
- **Sanislo Elementary Wetland Project:** The Sanislo PTSA was awarded money for native plants. The goal of their project was to build a small interpretive garden trail in the buffer zone of the wetland. The trail is designed to act as an outdoor classroom and to reveal views into the wetland.
- **Piper's Creek, Clean Water Act:** Carkeek Watershed Community Action Project and the Earth Corps Club of Nathan Hale High school were awarded funding to create an audio/video of a community panel discussion about 15 years of the Piper's Creek Watershed Plan and its accomplishments. The students also produced curriculum packets for the Carkeek Watershed Center and made copies available to Greenwood Library for community members to help with the goal to restore our waters.
- **Friends of Madrona Woods:** The Friends wanted funds for native plants to complete their studies of native northwest plants and how they were used by Native Americans, ending in a restoration project in the Madrona Creek Watershed. Three schools in the neighborhood participated in this project: Madrona K-8, St. Therese, and Seattle Girls School. The project involved clearing, planting and mulching for five successive weeks.
- **Salmon Homecoming:** The 13th annual Salmon Homecoming was held at Magnuson Park on September 8th, 9th, 10th and 11th. The forum was held on the 8th and brought together people involved in efforts to recover Salmon in the Northwest. The forum was simulcast from the NOAA facilities at Sand Point by TVW and broadcasted live over the internet, cable and broadcast television. Over 120 people participated from around the region including Federal and State fisheries representatives. The other portion of the event was hosted in an old airplane hanger and was attended by four hundred students. Six canoes made the journey from Canada, joined by canoes from Muckleshoot, Tulalip Nisqually and Suquamish tribes.
- **Longfellow Creek Watershed Council:** The Longfellow Watershed Council received funds for a new initiative in the watershed to develop partnerships with automotive repair shops to improve and protect water quality in Longfellow Creek as stated in the watershed action plan. The task was accomplished through questionnaires and interviews with watershed residents and automotive businesses.

Anthony Matlock (206) 386-9746

3.6.5 Urban Creeks and Watershed Stewardship Programs

The goal of the urban creeks and watershed stewardship programs is to expand and strengthen urban creek stewardship in our five major watersheds by leveraging partnerships, coordinating internally, and facilitating implementation of watershed plans and programs. Highlights from 2005 and the first six months of 2006 include:

- Partnered with Resource Conservation on Natural Yard Care Neighborhood workshop series of four classes in the Piper's Creek and Longfellow Creek watersheds in Spring 2005 and the next round of workshops in Thornton Creek watershed in the spring of 2006;
- Partnered with SHA to produce a brochure for the Highpoint residents on how to live with the new natural drainage system (NDS) in their development and how it relates to protecting Longfellow Creek. Brochure published June 2006. This was one of the major tasks under the Highpoint NDS Outreach and Education grant from Ecology.
- Represented SPU on WRIA 8 Public Outreach Committee. Assisted in the planning and staging of the third in a series of Lakeshore Living workshops for 35 Lake Washington homeowners in Seattle in 2005;
- In 2005 developed new Aquatic Habitat Matching Grants program as called for by City Council Resolution 30719. Guidelines were adopted by Council; the grant Review Board was established; and the first round of grants awarded. The purpose of this program is to support projects on both public and private property that improve, preserve and restore aquatic habitat in creeks and along creek, marine or lake shorelines that has been damaged by the city's stormwater (drainage) system. Pre-proposals for the second round of grants were solicited in the spring of 2006.
- SPU was represented on all four urban creek watershed councils, three of which are also staffed by SPU (Fauntleroy is community-led).

Kathy Minsch (206) 615-1441

Creek Steward Program

The Creek Steward Program provides opportunities to learn about our creek systems and get involved in sustaining Seattle's urban creeks. Through partnerships with Seattle Parks and Recreation (SPR) and other agencies, local community groups, businesses, schools and individuals, the Creek Steward program restores riparian vegetation, maintains existing plantings, monitors creeks and salmon, and educates citizens in best management practices to benefit our urban creeks. Among the 2005 and first half 2006 accomplishments:

- Recruited and trained 56 Site Stewards on 50 sites in five watersheds. Site Stewards provide long-term care and maintenance for established sites along Seattle creeks. Tens of yards of invasive ivy and blackberry were composted in place or removed by truck, and over 400 bags of invasive weeds were removed from riparian areas. Over 900 native trees and shrubs were planted in riparian areas. In 2005, 1609 volunteers contributed 3537 hours in support of Seattle creeks. Since January 2006, some 400 volunteers have logged over 730 hours of volunteer time. Continued work with business and educational volunteer partners including Starbucks, CDM Consulting, 4H, Ernst and Young, and local elementary and high schools.
- Continued Backyard Steward program in 2005. Enabled citizens to report violations of Environmentally Critical Areas (ECA) code and provided technical assistance on over 20 occasions.
- Presented three tours of Meadowbrook Pond to students, organizations and the general public. Held two "Living with Beavers" educational and hands-on workshops with over 300 attendees.
- Conducted four Naturescaping workshops to teach creek-friendly gardening practices in

the Thornton and Longfellow Creek watersheds (in partnership with King County and community organizations). 318 attendees learned about Creek Friendly Gardening techniques and salvaged native plants to be used in their new landscapes.

- Provided training in Macroinvertebrate (streambug) Monitoring – volunteers then sampled in Taylor, Longfellow and Fauntleroy Creeks
- Continued support to residents on the innovative stormwater control swales that comprise the Natural Drainage Systems in Piper's Creek watershed. Held community work party and tours.

Bob Spencer (206) 684-4163

Longfellow Creek Watershed Project

The Longfellow Creek Watershed Action Plan guides the work of this program. The four major goals are to: (1) improve habitat; (2) improve water quality and stormwater management; (3) increase public education and outreach; and (4) improve and enhance public access. The Plan outlines recommendations and commitments made by cross-jurisdictional partners, including SPU, Parks and other City departments as well as County agencies, community groups and Neighborhood Councils. The Watershed Specialist staffs the Longfellow Creek Watershed Council and collaborates with several teams at SPU (Watershed Community Stewardship, Education, and Environmental Justice) as well as Parks (Environmental Learning Centers) to meet overlapping objectives. In 2005 and first half of 2006:

- $16,340 King Co. Natural Resources Stewardship Network grant awarded to Longfellow Creek Watershed Council/Delridge Neighborhoods Development Association for restoration work at SW Brandon and interpretive sign.
- Technical assistance grant awarded to partner, Delridge Neighborhoods Development Association, from National Parks Service Rivers and Trails unit for "Dells and Ridges" project to identify and plan connections to the Longfellow Creek Legacy Trail.
- Stewardship activities expanded to three sites/month:
    - SW Brandon St.:11 work parties; 1,073 volunteer hours (value $13,412); one acre of invasives removed, area cardboarded and thickly mulched; installed 500 plants; Seattle works partnership for 5 work parties; 35 Nordstrom volunteers for Day of Caring
    - Roxhill Bog: 376 hours contributed by 1 site steward alone; 25,000 plants installed; 100 lbs. Mixed native seed sowed; 30 cubic yds. non-native plants removed
    - Longfellow Greenspace at SW Thistle: New site steward
- Service hours contributed by students from Our Lady of Guadalupe School, Seattle Lutheran HS, Chief Sealth HS, West Seattle HS, Safe Futures Youth Program, and Seattle Pacific University.
- Designed and produced "Living in the High Point Community: Your Connection with Longfellow Creek" brochure to educate residents about the High Point Natural Drainage System and stewardship behaviors to protect it and Longfellow Creek.
- Worked with graphic artist to create interpretive sign "How Trees Help a Creekside Community Grow" to be installed at Longfellow Creek and Brandon St

- Provided creek educational programs and tours for Adult and Youth Action teams as part of High Point Healthy Homes Project
- Staffed 13 Longfellow Creek Watershed Council/Stewardship Committee meetings
- Worked cooperatively with University of Washington Landscape Architecture Studio classes on connection to Longfellow Creek in their open space inventory and design process for the Delridge neighborhood
- Revised Longfellow Creek brochure/map highlighting the Watershed Council work, restoration projects and map of Legacy Trail to match interpretive maps on trail
- Coordinated logistics for Watershed education programs for 650 Seattle Public School students (integrated with Land and Water classroom unit)
- Contributed to several articles in the Seattle P-I, Times and West Seattle about Longfellow Creek in relation to the Legacy Trail, High Point or stewardship work. Highlight was cover story in Seattle times Weekend section 8/18/05.

Sheryl Shapiro (206) 615-1443

Piper's Creek Watershed Project

The Piper's Creek Watershed Action Plan for the Control of Nonpoint Source Pollution (1990) outlined a series of recommendations, which included providing a Watershed Interpretive Specialist to help develop and coordinate community outreach on watersheds and to improve water quality. A review of the Plan was completed in 2000 that outlined new recommendations to further meet the goals of the Watershed Action Plan. Among the accomplishments in 2005:

- Action Plan Implementation. The annual status report on the Piper's Creek Watershed was produced and distributed in May. Two Watershed Council meetings were convened. Agenda items included: pesticides in urban creeks, Venema habitat restoration, Venema Natural Drainage Project plan, and Seattle's Environmentally Critical Areas agenda.
- Living Green in Piper's Creek. 149 people attended programs on watershed friendly gardening and home remodeling. 75 people attended the Real *People's Gardens Tour* featuring 9 watershed-friendly gardens. Tours and outreach of Broadview Green Grid, Carkeek Cascade and SEAstreet Natural Systems projects included over 323 people in 16 tours.
- School Outreach. 2347 Students from 53 schools participated in naturalist programs on Urban watershed topics at Carkeek Park and Longfellow creek.

Events related to the Piper's Creek Watershed in 2005 included:

- Carkeek Park Earth Day. Cooperative with Carkeek Watershed Community Action Project. Approximately 100 youth stenciled drains, distributed information and picked up 80lbs of trash.
- Carkeek Day. Piper's Creek interactive display and information for community based celebration at Holman Rd shopping center (30 attendees).
- Piper's Creek Annual Salmon Celebration. Over 200 attendees.
- 2005 Piper's Creek Watershed's Greenwood Seafair: Featured Bert the Salmon and Captain Carwash demonstrating the drain insert that people can borrow for community

carwashes so that soapy suds are diverted from the creek. Estimated parade attendance is 10,000 people.

Beth Miller (206) 684-0877

Taylor Creek and Deadhorse Canyon

Located in Southeast Seattle, Taylor Creek is a small creek that flows from the Skyway District of King County and into Lake Washington at 68th Avenue South. Most of the reach that flows through Seattle proper is within Lakeridge Park and has formed Deadhorse Canyon. Though greatly improved over past years, the area continues to suffer from an infestation of invasive weeds. Volunteers have been trained to recognize invasive weeds and in proper planting techniques for native species. As part of the broader Creek Stewardship Program, the Taylor Creek Stewardship effort provides support to residents concerned with improving the natural habitat of the entire Taylor Creek watershed in general and the Dead Horse Canyon area specifically. Such support includes, but is not limited to, tools and supplies, northwest native plants, volunteer recruitment, refreshments, and logistical support. Among the accomplishments during 2005 and the first half of 2006:

- Supported 17 regularly scheduled monthly work parties (over 1170 volunteer hours);
- Coordinated and supported 4 special work parties (over 900 volunteer hours);
- Supported High School internship program, which trains students to teach elementary school level basic watershed sciences;
- Removed over 60-70 cubic yards (conservative estimate) of invasive weeds;
- Planted over 1200 plants, including 450 trees. All plants were northwest natives suitable for riparian habitats. Future plantings will include a broader diversification of species;
- Removed 750 pounds of illegal dumping (by SPU, Parks Dept numbers not available as crews do not track);
- Continued to maintain the closure of “volunteer trails” to reduce erosion; and
- Promoted the publication of the Urban Nature Project’s Habitat Conservation plan for the canyon. Plan includes an inventory of existing biota including beneficial native and undesirable invasive species, an assessment of habitat improvements done to date and recommendations for future efforts. The full report is available for review.

Tom Gannon (206) 684-8565, Bob Spencer (206) 684-4163

Thornton Creek Watershed Program

The Thornton Creek Watershed Oversight Council (TCWOC) was established by Seattle City Council resolution 70901 (adopted fall 2004) to oversee implementation of a Five-Year Action Agenda based on the draft Thornton Creek Watershed Action Plan of 2001. The council also provides a forum for discussion of watershed issues and to engage the community in the restoration of the watershed ecosystem. Its members include representatives from state and local governments, environmental groups, community councils and neighborhood groups, watershed residents from different parts of the creek, business, and education. SPU staffs the watershed council and facilitates the implementation of priority programs and projects, such as the Homewaters Project contract, creek steward program activities in the Thornton Creek watershed, coordination with other city agencies, responding to community issues, and

implementation of special projects. Among the accomplishments during 2005 and the first half of 2006:

- A combined slate of new and continuing members were officially appointed by the Director of SPU in May 2005 to form the TCWOC. The watershed council met eight times in 2005 and three times in 2006 through June. Subcommittees form and meet as needed on specific policy or implementation issues.
- In 2005, the TCWOC heard presentations on a variety of programs, projects, and issues including: critical areas ordinances in Seattle and Shoreline, the Pinehurst natural drainage system project, creek restoration projects, pesticides monitoring, and a new water quality survey in Shoreline. Members also toured the watershed in the summer. The 2006 meetings have focused on Thornton Creek CIP projects; Seattle programs (Restore Our Waters, NPDES, Rainwise, Natural Drainage Systems, Aquatic Habitat grants); city, county and state monitoring programs; and Seattle's business inspection program.
- Staff developed and distributed the First Annual Thornton Creek Watershed Action Agenda Report on accomplishments from July 2003 through December 2004 in implementing the Action Agenda.
- SPU continued contracting the Homewaters Project under a MOA with SPU to conduct outreach and education programs in the Thornton Creek Watershed. For 2005 and the first six months of 2006, the Homewaters Project accomplished the following in the watershed:
    - Provided five Long Walks for over 100 residents of the North and South Forks of Thornton Creek.
    - Drafted a new virtual tour of the Thornton Creek Watershed to encourage exploration and understanding of the watershed.
    - Implemented the second year of a Green Mapping program with 165 students from five City high schools participating and hosted a city-wide forum at Seattle City Hall where students shared results.
    - Provided the Water & Community GIS-based Middle School Program to 200 eighth grade students from two middle schools.
    - Distributed 420 copies of the Thornton Creek Watershed Guide.
    - Upgraded website to make it easier for the public to access current and historical watershed information

Kathy Minsch (206) 615-1441

3.6.6 Stormwater Outreach and Education

Stormwater outreach and education develops and publishes educational materials on what impacts people can have on stormwater runoff and what people can do to protect water quality. Conducted the following activities in 2005:

- Created new Bert the Salmon cartoon – "Be in Tune with the Environment" - on keeping cars tuned to prevent pollution of our waterways. Cartoon aired eight weeks. Co-funded surveys at two community festivals with Channel 11, which showed the message was understood;

- Wrote two Curb Waste and Conserve articles: (1) “Keeping our Creeks, Lakes and Sound Clean” in the summer issue related to nonpoint source pollution and storm drains and (2) an article on leaves, storm drains and flooding in the fall issue;
- Funded Puget Soundkeeper Alliance to expand new watershed stewardship pledge book to include whole city, not just Lake Union;
- Partnered with Parks to fund Puget Soundkeeper Alliance water quality signs project around Lake Union;
- Distributed 1,000 flyers and 1,000 brochures on pet waste management to 50 Seattle businesses including animal hospitals, veterinary clinics, pet stores, and dog groomers; and
- Distributed 1,000 door hangers on how to prevent debris clogging of catch basins to businesses and residents located near storm drains the flood frequently.

Carlton Stinson (206) 684-7624

3.7 ILLICIT DISCHARGES

In addition to the programs described below, investigation of illicit discharges and improper disposal of materials to surface water are also incorporated into a number of programs described elsewhere in this report, including Water Quality Complaints (Section 3.4.2), Business Inspection Program (Section 3.4.3) and TV inspections performed on storm sewers (See 3.8 Operations & Maintenance of Drainage System).

3.7.1 SPU Spill Coordinator/Response Program

SPU implemented a Spill Coordinator Program in 1998 to respond to hazardous material spills occurring in the Seattle service area. The role of the Spill Coordinator is to lead SPU response activities including: evaluating hazardous substance spills, deciding how best to mitigate and clean up the spill, mobilizing and committing SPU resources, and overseeing the activities of a spill response contractor, if needed. A Spill Coordinator is available 24-hours a day, including weekends, on a rotating 1-week duty schedule. At present, the network consists of 11 active Spill Coordinators (trained to the Hazardous Materials Emergency Response Technician level) in the network, with 5 reserve Spill Coordinators available for fill-in spill duty as necessary. The spill response experience from 1998-2005 is shown in Table 4.

Table 4. Spill Response

	1998-2000	2001	2002	2003	2004	2005
# of Spills	86	70	75	69	106	108
SSC response	48	60	57	52	80	84
Non-duty hour	12	9	30	28	37	27

As of 6/30/06, Spill Coordinators have responded to 76 spill reports in 2006. There is an increase in the number of incident referrals by other City Departments that are spills that they may have caused that may impact SPU infrastructure, spills that they may have observed or responded to that may involve SPU facilities or infrastructure, or calls regarding spills from third parties to their department’s dispatch center. SPU is continuing a dialogue with other City Departments to clarify our response roles and expectations. Petroleum-based products continue to be the largest category of spilled materials.

A protocol was developed and is now in force that provides for Spill Coordinator assistance to Illegal Dumping Inspectors in properly handling and disposing of chemicals that are dumped in the City right-of-way. Inspectors have also been trained to the emergency response Operations level to give them more information for recognizing and identifying chemical hazards.

A specific protocol was developed, per agreement and cooperation with the Coast Guard and the Department of Ecology, for quick response to releases of petroleum products from storm system outfalls at Florida Street and Lander Street on the west side of Harbor Island. The protocol provides for timely containment of discharges at the outfall and for investigation to determine the source of the discharge.

John Labadie (206) 684-8311

3.7.2 Illegal Dumping

SPU has developed a number of programs to respond to litter and illegal dumping activities in the city and to provide for the efficient collection of litter in public places. The objectives of these programs are to reduce or prevent litter activities, enforce city ordinances, and facilitate community cleanup. An effective illegal dumping program reduces pollution being washed from our streets and alleys into the storm drains and receiving waters. Among the accomplishments in 2005:

- Resolved over 3,500 cases of which more than 3,100 were reported over the Illegal Dumping Hotline (206-684-7587);
- Provided for the pickup, collection and removal of 2,140,000 pounds[1] of illegally dumped materials on City streets, roads, and public areas. This includes illegally dumped materials along state highways in the city as well as in publicly owned open space; and
- Crews cleaned up approximately 8,193 illegal dumpsites from the community in 2005.

Over the first six months of 2006, SPU has resolved over 2,100 cases of which more than 1,800 were reported over the Hotline.

Alex Tonel (206) 684-4170

3.8 OPERATIONS & MAINTENANCE OF DRAINAGE SYSTEM

SPU Drainage and Wastewater Operations Division is responsible for drainage system maintenance. Table 5 and Table 6 list the different activity accomplishments from January 1, 2005 through most of December 2005. Due to conversion to a different maintenance management system, some of the December data may not be included.

[1] The amount of illegally dumped materials may not include litter detail, which is not measured the same as illegally dumped materials. Depending on crew and vehicle availability, clean up may involve more or less frequent litter detail versus illegal dumping as a measure of tonnage.

Table 5. 2005 Quarterly Totals

Main Line Cleaning	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total lineal feet
Hydrocut	588	0	0		**588**
Machine Rodding	579	55	0	380	**1014**
Jet Cleaning	2,016	2,674	1,325	1,126	**7,141**

Main Line TV Inspect	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total lineal feet
TV Line	1,346	3,388	2,294	7,548	**14,576**

Table 6. 2005 Drainage Maintenance

Activity	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Mechanical Clean-Catch basin/Sand box	2,958	1,273	2,339	1,367	**7,937**
Manual Clean Inlets*	776	440	891	1,581	**3,688**
Power Rodding (lineal feet)	1,001	37	54	867	**1,959**
Inspect Catch Basin/ Sand Box	6,983	5,959	2,236	8,480	**23,658**
Repair/Replace Drain Structure	107	73	111	66	**357**
Maintain Ditches (lineal feet)	36,021	31,325	45,393	35,189	**147,838**
Closed circuit TV Inlet/Outlet Pipes (lineal feet)	440	37	135	869	**1,481**
Clean Settling Basins/Ponds	1	5	3	1	**10**
Jet Cleaning (lineal feet)	6,722	8,469	2,633	4,657	**22,481**
Clean Bridge Drains	54	22	116	445	**637**
Hydrocut (lineal feet)	55	409	6	290	**760**

* Note that tracking of inlet cleaning has changed since 2003. Cleaning of inlets is now included in the catch basin inspection process and is no longer tracked separately. Thus, there were more inlets cleaned in 2005 than represented in the table. Typically for each catch basin inspected, one or two inlets will be cleaned.

Pat Gorham (206) 386-9730

3.9 OPERATIONS AND MAINTENANCE OF ROADWAYS

Seattle Department of Transportation (SDOT) Street Maintenance Division has a staff of approximately 65 field and management personnel involved in street sweeping and de-icing. The City has seven sweepers that follow a schedule (weather permitting) of cleaning public streets and roads. Industrial and commercial areas are regularly swept on a rotating basis. Bike paths are cleaned approximately once a month. In addition, roadways known to receive a significant number of leaves receive repeated visits during autumn. Street cleaning crews also respond to emergency calls, for example oil spills on the roadway that are typically cleaned up with absorbent pads, brooms or sphagnum. During freezing weather, the City uses sand and anti-icing and deicing products to aid traffic. After winter storms, street sweepers pick up any remaining sand. In 2005, approximately 29,579 curb miles of streets were swept. Litter control is the responsibility of the SPU Community Services Division, which coordinates a number of volunteer programs to help keep the City's roadways clean, such as Adopt-a-Street, Neighborhood Cleanup, and Spring Clean. Table 7 shows the 2005 SDOT Street Maintenance

accomplishments and expenditures for drainage-related work.

Table 7. Selected 2005 Expenditures for Street Maintenance

Activity	Accomplishments (Units)	2005 Expenditures
Mechanical sweeping	29,567 Curb Miles	$949,635
Street flushing	736 Work Miles	$25,854
Alley flushing	3,958 Alley Blocks	$138,211
Snow & ice response	2,374 Labor Hours	$75,317

SDOT street maintenance workers have been trained in erosion and sediment control and best practices for roadway maintenance (Regional Road Maintenance Program). Through SDOT's Environmental Management System, they are challenged to identify environmental aspects and impacts of their work.

Jim Dare (206) 684-5319

3.9.1 Street Sweeping Pilot Study

In 2004, the City of Seattle began the planning stages of a year long street sweeping pilot that began in June 2006. The pilot's goal is to determine the optimum combination of catch basin cleaning and street sweeping to maximize the efficiency of removing sediment from a watershed and preventing those sediments from discharging to receiving waters. Over the past year the City has undertaken and completed several tasks to plan and implement the pilot study:

- Formation of an intradepartmental team comprised of urban scientists, operations staff, analysts, planners, consultants, and financial staff;
- Selection of two residential areas for the sweeping study which include a swept and non-swept (control) basin in each area. A third area in the Duwamish drainage basin is currently being selected;
- Completion of a sampling and analysis plan that includes sampling street dirt picked up by the regenerative air sweeper, street dirt left on the street after sweeping, and sediment in catch basins;.
- Extensive community outreach in the study areas including several mailers, a website, project phone number, and sweeping schedules;
- Installation of no-parking signs in the swept areas; and,
- Starting the pilot study in two of the swept areas with weekly sweeping.

Keith Ward (206) 615-0734

3.10 MUNICIPAL TRAINING

3.10.1 Drainage Maintenance Crew Training – Standard Operating Procedures

In 2001, SPU initiated a program designed to address soil disturbing activities related to routine maintenance and repair work on drainage infrastructures located within environmentally sensitive areas. Such areas include both fish and non-fish bearing streams, plus ditches that have the potential to impact creeks. Standard Operating Procedures (SOPs) have been

developed as part of this maintenance program describing appropriate Best Management Practices (BMPs) to be included as part of the maintenance activity to protect the creek in which work was being conducted and the resources downstream of the work area. The focus of each SOP was to avoid adversely impacting water quality, primarily by containing loose sediment and containing turbidity to inside the isolated work area. The SOPs were developed to provide guidance and standards to drainage maintenance crews that conduct routine maintenance to the drainage infrastructure within environmentally sensitive areas on a regular basis. In 2003, the program received full SEPA review and was permitted under the Washington Hydraulic Code. The program addresses the following activities:

- *Sediment Removal*. The removal of excess sediment from the drainage system including catchbasins, culverts and deposition areas within creeks and ditches that are creating conveyance problems;
- *Creek Structure Maintenance*. Re-anchoring, repair, removal, or replacement of creek structures (rock or boulder weirs, logs, root wads, El-wood, boulders) placed in the creek as part of a restoration project;
- *Ditch Cleaning/Reshaping*. Cleaning/reshaping of ditches that have potential to impact a creek;
- *Culvert Repair*. Repair of culverts located within creeks or ditches with potential to impact a creek;
- *Minor Bank Stabilization*. Stabilization of stream and in-line pond banks and the banks of ditches that have potential to impact a creek. This work only includes minor stabilization that can be considered maintenance to prevent bank sloughing or continued erosion;
- *Hydrocutting*. Hydrocutting of roots, grease and miscellaneous debris within pipes located within a sensitive area or ditch with potential to impact a creek in order to provide proper conveyance;
- *Trash And Debris Management*. Removal of trash and organic debris from creeks and from ditches that have potential to influence a creek; and
- *On-Line Pond Maintenance*. General maintenance work within a retention/detention pond that is hydraulically connected to a creek. Work could include, but is not restricted to, sediment removal, repair or replacement of natural structures (such as LWD), repair of existing culverts, debris and trash removal, or vegetation establishment and maintenance.

Crews conducting this kind of work receive ongoing training in these SOPs.

In 2004 the Drainage and Wastewater Division implemented a training program developed by the Seattle Stormwater Coop that addresses all soil disturbing activities wherever they occur. This program utilizes a comprehensive list of known practices that minimize soil disturbance and protect the surrounding area from runoff. The program incorporates a checklist to determine where the potential for air and water quality violations exist and how to mitigate them before the project is implimented.

Duirng 2005 and the first half of 2006, SPU Drainage and Wastewater Operations continued the traning and documentation program. In March 2006. the Drainage and Wastewater staff received four hours of additional training on stormwater BMP's and proper surface water management techniques to address and avoid turbidity issues on maintenance projects.

Gary Lockwood (206) 684-7750

3.11 INFORMATION & DATA COLLECTION, MANAGEMENT & ANALYSIS

This section highlights some of the activities conducted during this reporting period the support decision making, project design, and programmatic modifications. It includes not only on-going data collection and analysis efforts, but also summarizes some of the underlying tools that support data and information management.

3.11.1 Information Support Programs

Precipitation Monitoring

Currently, there are 17 rainfall-monitoring stations located throughout the city. No major upgrades, expenditures, or maintenance were performed in 2005. Table 8 provides average monthly rainfall accumulation. The average annual rainfall accumulation in Seattle in 2005 was 32.05 inches

Table 8. Average Monthly Accumulations (inches) in 2005

Jan	3.41	Jul	0.80
Feb	1.03	Aug	0.40
Mar	3.09	Sep	1.14
Apr	2.98	Oct	2.52
May	3.27	Nov	4.79
Jun	1.72	Dec	6.90

Hai Bach (206) 684-5139

Surface Water Quality Databases

SPU staff maintain several Microsoft Access databases, including surface water quality complaint investigations, business inspections, Lower Duwamish superfund inspections, drainage system inspections, and monitoring and sampling data.

Ellen Stewart (206) 615-0023

GIS Support

The history of Seattle's Geographic Information System (GIS) dates back to the mid-1980s. Evolving from a small installation in the former Seattle Engineering Department, the City's GIS was originally built to improve the way the City manages and operates its utility infrastructure. Seattle's GIS capabilities are now firmly entrenched within the daily business functions of most City Departments. Available GIS data can be combined to produce a wide variety of maps and/or to perform analysis. The system is used to inform decision makers, engineers, and planners, help deliver services to the public, dispatch Police and Fire personnel, support field work management, and manage City real estate. The City of Seattle's GIS base map, referred to as the Central Geographic DataBase (CGDB), consists of ten GIS databases. These ten base layers are the foundation for the City's geographic systems environment and are the shared layers to which all other thematic GIS layers are spatially registered. The CGDB is composed of the survey control layer, the Platted Subdivision layer (lots, blocks and plats commonly referred to as the Legal layer), Parcels, the Street Network database, Discrete Address Points, Common Place Names, Buildings, Topography, Orthophotography, and LiDAR

imagery. This set of base layers is accurate to +/- 1 to 2 feet and was constructed using a combination of existing coordinate information, Global Positioning Satellite (GPS) surveys, photogrammetric densification, and calculations based on plat information and other survey data. The result is one of the most spatially accurate sets of GIS base layers in the country.

SPU's operational Drainage & Wastewater GIS layer contains over four million records representing all sewer and storm mainlines and service connections. It was initially constructed over a period of three years in the early 1990s from two main information sources: the Side Sewer Cards and the original CAD-based Truck Set maps. Today's system is maintained by an SPU staff of five and produces a variety of hard copy custom and standard map sets (*e.g.,* 200-scale maps, Truck Set maps). City and Utility staff have direct access to the data through easy-to-use custom interfaces.

The primary focus for the Drainage and Wastewater (DWW) GIS continues to be data accuracy in support of SPU Asset and Work Management. In 2005 and 2006, the majority of our labor resources were devoted the following activities:

- Entering new infrastructure into the GIS system from construction plans and sewer plats;
- Support of the Utility's migration to Maximo as the new DWW Work Management System;
- Improvements and normalization of the GIS inventory of catch basins, ditch and culvert data; and,

Rigorous programmatic checks of the DWW GIS data to identify and correct errors, inconsistencies, and null values (*e.g.* extensive research into missing invert elevation, installation year, diameter, and material).

Harvey Arnone (206) 233-0028, Stephen Beimborn (206) 233-0038

Basin & Creek GIS Delineation

Beginning in the fall of 2001, SPU began updating the creek watershed boundaries in GIS for Thornton, Taylor, Fauntleroy, Longfellow, Schmitz and Piper's creeks using new and revised ditch, culvert and topographical information. Within each of these creek watersheds, SPU has also been delineating outfall sub-basins using GIS mainline data, topography, and ditch and culvert data. The watershed boundary and sub-catchment boundary delineations are 100% complete. In 2002, SPU also began annotating smaller creek basin boundaries and started delineating drainage basin boundaries for major outfalls discharging into the City's receiving water bodies. These delineations are 95% complete. In 2005 and 2006, updates were made to the basin layers based on new drainage information from the University of Washington, Port of Seattle, Washington Department of Transportation and King County.

Scott Reese (206) 733-9172

3.11.2 Receiving Waters

Urban Creeks Watershed Analysis

The Urban Creeks Watershed Analysis is a study that assessed the physical and biological conditions of five salmon-bearing watersheds in the City of Seattle – Thornton, Piper's, Longfellow, Taylor, and Fauntleroy Creeks. The purpose of the study was to provide technical

data to inform decision-makers in planning projects and programs that affect fish and aquatic habitat in Seattle's creeks. The study assessed fish use in each system including existing and potential distribution, passage for migration, and changes in the annual distribution of salmon spawning activity and in smolt (juvenile salmon) production. Spawning surveys and smolt trapping are part of ongoing research efforts. Physical data included habitat quantity and quality, channel conditions, riparian conditions, sub-basin delineation, surficial geology, and land use. Field inventories are completed, and the data are being converted from Microsoft Access to an Oracle database, as part of Seattle Public Utilities' development of a Science Information Management System. The data are further represented spatially using the City of Seattle's Geographic Information System (GIS). The physical data are being analyzed to better understand how watershed processes affect the availability and condition of habitat in each system. The results of these analyses are being captured in individual technical reports on Channel Condition (Geomorphology), In-stream Habitat Condition, Riparian Condition, and Fish Use, which will provide guidance for managing Seattle's aquatic resources. The data are also currently being applied to an integrated "State of the Waters" report which provides information on baseline conditions in Seattle's aquatic systems. In addition, data from the Urban Creeks Watershed Analysis are applied, as appropriate, to the planning and design of individual in-stream projects.

Katherine Lynch (206) 233-5194

Aquatic Community Assessment Program

SPU continues to use regionally developed sampling protocol, converting the raw data into the regionally accepted Benthic Index of Biotic Integrity (B-IBI). In 2005, thirteen samples were collected from Piper's and Thornton Creeks. Benthic macro-invertebrates were collected at these sites by a combination of volunteers and SPU staff. SPU continues to collect three replicate samples per site, with three square feet of creek bed sampled per replicate. SPU's participation in King County's Normative Flow project is on-going. This research will involve using SPU's B-IBI scores to look at the relationship between flows and biological integrity in Thornton Creek. Two reports on the B-IBI data have been written, one for the 2003 data and one for the 2004 data. Another report on the 2005 data will be available in fall of 2006. A Quality Assurance Project Plan (QAPP) was written for this monitoring in 2005 and will be updated in 2006.

Laura Reed (206) 615-0551

Storm Event Sampling

A storm event is defined as a storm that lasts for a minimum of four hours and contributes at least 0.1 inches of rain with an antecedent dry period (less than 0.01 inches of rain) of at least eight hours. Storm event samples (flow-weighted composite samples) are collected at the following four locations:

Piper's Creek basin:
- Venema Creek at the mouth
- Piper's Creek at footbridge downstream of Venema Creek
- Piper's Creek above orchard

Longfellow Creek at West Seattle Golf Course

For the period January 2005 through December 2005, storm samples were collected at the

three Piper's Creek stations on the following dates:

March 16, 2005
July 18, 2005

Samples were collected during the following two storm events at the Longfellow Creek station:

March 26, 2005
July 18, 2005

Analytical reports from these and previous storm sampling events are retained in an electronic database and hard copy files maintained by SPU staff.

Mike Hinson (206) 733-9134

Coho Pre-spawn Mortality Investigation

Over the last few years, SPU has been working with other resource agencies to investigate the cause of the high levels of coho salmon pre-spawn mortality that have been observed in urban creeks in the Puget Sound area. In 2005, SPU, WDFW, and volunteers carried out daily spawning surveys in Longfellow Creek to support coho mortality studies conducted by the National Oceanic and Atmospheric Administration (NOAA). SPU also continues to support weekly coho spawning surveys by Washington Trout in other Seattle urban creeks during October through December.

Laura Reed (206) 615-0551

3.11.3 CIP Support & Effectiveness Monitoring

Hydrologic and Water Quality Monitoring of Natural Systems

SPU has been planning and conducting performance evaluations of City-designed natural drainage systems (NDS) projects. These projects include 1) SEA Street (NW Seattle; completed in 2001), 2) Broadview Green Grid (NW Seattle; majority complete by 2004), 3) Viewlands Swale (NW Seattle; completed 1998), 4) Highpoint Housing Redevelopment (SW Seattle; under construction), and 5) Venema NDS (NW Seattle, in design). These projects represent retrofits to the existing drainage infrastructure, and monitoring objectives focus on flow control and/or water quality. Monitoring (flow and/or water quality) has been implemented for all the projects listed above. Specifics on the Broadview, Highpoint, Pinehurst, and Venema monitoring are presented below.

Broadview Green Grid. The Broadview Green Grid (BGG) is designed to provide both flow control (infiltration and detention) and water quality treatment (infiltration with some biofiltration). In 2003 SPU began monitoring to evaluate the performance of the BGG. Baseline monitoring downstream of the project (at NW 107th St) was discontinued in 2004 at the start of project construction. Construction was completed in late 2004. Additional flow monitors were installed at three new stations to measure flow through the system. Post-construction flow monitoring began once construction was completed. Post-construction water quality monitoring will begin in late 2006.

High Point Project. SPU is partnering with Seattle Housing Authority (SHA) to incorporate natural drainage systems in the High Point mixed income redevelopment in West Seattle. For a description of this Seattle Housing Authority project refer to Section 3.12.1 Natural Systems.

Limited pre-construction monitoring was conducted at High Point in 2004. In 2005, SPU started designing the block scale monitoring to evaluate the performance of some of the stormwater management methods that were constructed in Phase 1. This block scale monitoring is scheduled to begin in late 2006. In addition, SPU is planning on conducting basin scale monitoring to evaluate the performance of the overall NDS design once project construction is complete and vegetation is established.

Venema NDS. The Venema NDS is being designed to provide both flow control (infiltration and detention) and water quality treatment (infiltration with some biofiltration). For a description of this Seattle Housing Authority project refer to Section 3.12.1 Natural Systems. Pre-construction flow and water quality monitoring downstream of the proposed project (NW 120th St & 4th Ave NW) began in 2002 with support from the University of Washington. Samples are analyzed for standard stormwater pollutants (total suspended solids, fecal coliform bacteria, total and dissolved metals, and NWTPH-Dx). Pre-construction water quality sampling was discontinued in early 2006 although flow monitoring continues.

Ingrid Wertz (206) 386-0015

CIP Performance Evaluation

During 2005 and the first half of 2006, SPU continued a long-range monitoring program for SPU creek restoration projects to determine whether or not they are meeting their design goals. High priority in-stream construction projects are located in Piper's Creek, Thornton Creek, Longfellow Creek, Fauntleroy Creek and Taylor Creek. The following types of structures are monitored: wetlands, detention ponds, log weirs, rock weirs, an "el-wood" structure, off-channel pools, bank protection, gravel addition, pool addition, fish passage weirs, lunkers, root wads, and riparian replanting. The purpose of CIP effectiveness monitoring is to provide information on the level of improvement or protection afforded a water body as a result of the constructed system or BMP. This information will refine stormwater management decisions and advance the benefits gained by strategically investing in the most effective activities and projects.

The following table (Table 9) shows the distribution of new sites requiring monitoring through time. Each site is monitored intensively during the summer months for the first three years. All of the sites are monitored periodically during the rest of the year. After three years, the sites are checked yearly for structural damage or invasive weed problems. Action is taken to resolve these problems by the utility.

Table 9. Number of CIP Performance Sites

Year	No. of sites requiring monitoring
1999	8
2000	5
2001	3
2002	4
2003	4
2004	3
2005	2
2006	1
Total	30

Laura Reed (206) 615-0551

BMP Effectiveness Monitoring

Stormfilter Testing

The City of Seattle, along with Washington State Department of Transportation (WSDOT) and the City of Tacoma, is evaluating the performance of a Stormfilter system manufactured by Stormwater Management, Inc. The system, installed at the WSDOT I-5 test facility, is set up to conduct side by side testing of different filter media (*e.g.*, perlite-zeolite, perlite-zeolite-granular activated carbon (GAC), and GAC). The Stormfilter system is being evaluated for its ability to remove typical stormwater pollutants (*e.g.,* total suspended solids, total phosphorus, and metals) and organic compounds such as phthalates and petroleum hydrocarbons. Testing began in October 2003 and was completed in March 2005. Performance samples were collected during 12 different storm events and varying flow conditions (50, 100, and 125 percent of system design flow capacity).

Beth Schmoyer (206) 386-1199

Swirl Concentrator Testing

SPU has completed tests to evaluate the performance of Downstream Defender, Vortechs, and Stormceptor swirl concentrator stormwater treatment technologies under a grant from Ecology. Field sampling at the Downstream Defender and Vortechs sites began in 2001, and sampling of the Stormceptor unit began in January 2004. The number of storm events sampled at each of the test sites is shown in Table 10.

Table 10. Number of Storm Events Sampled at Swirl Concentrators

Test site	Samples
Downstream Defender	20
Vortechs	20
Stormceptor	8

Samples were analyzed for total suspended solids, total phosphorus, soluble reactive phosphorus, NWTPH-Dx, and metals (copper, lead, and zinc). The final project report was submitted to Ecology in March 2005.

Beth Schmoyer (206) 386-1199

3.11.4 ESA Information

Urban Blueprint for Habitat Protection and Restoration

Seattle's urban environment represents highly impacted habitats, requiring an adaptive management strategy to determine the best and most scientifically valuable actions to take. The final *Urban Blueprint for Habitat Protection and Restoration* (Urban Blueprint) was issued in December 2003, following extensive public and peer review. The Urban Blueprint analyzes chinook salmon behavior within five extant aquatic environments within the city and identifies important habitat attributes to protect and restore. Future supplemental science reports will be issued as findings result from our continued research program.

Based upon the findings in the Urban Blueprint and continuing research, the City of Seattle is continuing to focus on the following actions:

- Protecting the Puget Sound Shoreline. Protecting and restoring gravel beaches, eel grass beds and other shallow areas that provide plentiful food, refuge and spawning areas for other fish that chinook eat.
- Restoring Shallow Habitat along Lake Washington, Lake Union and the Ship Canal. Providing juvenile salmon with shallow shoreline areas, free of bulkheads and other structures, where they can feed and escape bass and other predators.
- Improving Shallow and Side-channel Habitats in the Industrial Duwamish Waterway. Restoring tidal flats, wetlands, side channels and other areas where juveniles can feed and rest while growing and adjusting to saltwater.
- Making Migration through the Ballard Locks Safer. Developing ways for adult and juvenile salmon to get past the Ballard Locks quickly and unharmed.
- Updating Local Regulations. Among regulations under review are Seattle's storm water code and shoreline master plan. The City's Comprehensive Plan will also incorporate, where appropriate, findings from the Urban Blueprint and additional salmon habitat research findings.
- Implementing Restore Our Water (ROW). The focus of ROW is to coordinate city capital investments across departments to improve aquatic environments utilizing current scientific research on those environments and science criteria, along with stakeholder review (for a more detailed description refer to the ROW section of this report).

The *Urban Blueprint for Habitat Protection and Restoration* report is available at:

http://www.ci.seattle.wa.us/salmon/blueprintdoc.htm

Jean White (206) 684-5185

3.12 CAPITAL IMPROVEMENT PROGRAMS

In 2004, SPU constructed several Capital Improvement Program (CIP) projects that included water quality elements. Some of the principal projects are listed below.

Darla Inglis (206) 233-7160

3.12.1 Natural Systems

Seattle Public Utilities has developed a "Natural Systems" approach to managing stormwater in those basins whose drainage systems are based on ditches and culverts. This approach uses swales, infiltration, and landscaping techniques to reduce stormwater runoff, lower pollutant levels and, in many instances, improve general neighborhood quality.

Broadview Green Grid Project

The Broadview Green Grid project constructed natural infrastructure to manage stormwater flow from an approximately 32-acre sub-basin of the Piper's Creek Watershed. At the time of construction, the project was Seattle Public Utilities' most ambitious Natural Drainage System project to date, involving 15 city blocks. The project benefits Piper's Creek by reducing the occurrence of large, fast flows of water that erode the creek channel, damaging habitat and transporting pollutants common to the urbanized, upper watershed areas. The project's natural infrastructure features swales, cascades, ponds, amended soils, increased vegetation and

reduced impervious areas. These features serve to slow the stormwater down and give maximum opportunity for infiltration, giving pollutants time to settle out and helping to sustain creek flows and reduce water temperatures. SPU partnered with Seattle Department of Transportation (SDOT) to provide neighborhood-scale improvements that integrate landscaping, traffic calming, and a sidewalk on each north-south street into the Natural Drainage System design. Construction, which began in August of 2003, was completed in September 2004. The project is in its second of three years of plant establishment and water quality and quantity monitoring. The project includes a "Cascade" system for 107th Street, from 4th to Phinney Avenues, and SEA Street-style improvements along 2nd and 1st Avenues NW and along Palatine and Phinney Avenues N, between 107th and 110th Streets..

Jim Johnson (206) 684-5829

High Point Project – A Natural Drainage Systems Approach

SPU is partnering with Seattle Housing Authority (SHA) to incorporate natural drainage systems in the High Point mixed income redevelopment in West Seattle. Over 120 acres, High Point is located in the Longfellow Creek watershed and makes up nearly 10% of the watershed. SHA's redevelopment project will replace the existing High Point development with new streets, new utilities, and 1600 units of housing. The High Point Natural Drainage System Plan integrates over 11,000 linear feet of vegetated and grassy swales that are modified from the SEA Streets pilot to fit into a traditional curb-and-gutter street. Each swale will manage the runoff from the adjacent street and block of housing. In addition, porous pavement sidewalks and a porous pavement street (first residential street application in Seattle) will reduce the overall impervious surface of the redevelopment. Finally, design guidelines for the residential properties will include impervious surface reduction incentives and downspout dispersion techniques. The performance of the High Point Natural Drainage System Plan has been predicted based on a block-scale HSPF model. Model results indicate that the plan combined with the stormwater pond will meet Seattle's Stormwater Code for peak flow control as well as match the peak and duration for the 2-year pre-developed pasture condition.

Phase I of the construction is complete and included all the project elements noted above as well as the stormwater pond for the project. As of August 2006, demolition of the existing housing and infrastructure in Phase II has commenced. It is expected that construction activities for underground utilities, surrounding swales, and multiple porous pavement sidewalks will commence in the second half of 2006. Completion of this second and final phase of development is not expected before 2008. SPU staff is working with the residents to develop an educational and stewardship program with DOE grant funds.

Jim Johnson (206) 684-5829

Pinehurst Green Grid Project

The Pinehurst Green Grid project is constructing natural infrastructure to manage stormwater flow from an approximately 49-acre sub-basin of the Thornton Creek Watershed. The project includes drainage improvements on 12 city blocks. The project benefits Thornton Creek by reducing the occurrence of large, fast flows of water that erode the creek channel, damaging habitat and transporting pollutants common to the urbanized, upper watershed areas. The project's natural infrastructure features swales, ponds, amended soils, increased vegetation and reduced impervious areas. These features serve to slow the stormwater down and give maximum opportunity for infiltration, giving pollutants time to settle out and helping to sustain creek flows and reduce water temperatures. SPU partnered with Seattle Department of

Transportation (SDOT) to provide neighborhood-scale improvements that integrate landscaping, traffic calming, and a sidewalk or walkway on most of the project blocks.

Construction began in August of 2005, and major construction was completed in June 2006. Landscaping will be completed in the fall of 2006. The project includes swales, street, sidewalk, and landscaping improvements on 19th Avenue NE between NE 117th and 115th Streets, 20th and 23rd Avenues NE between 117th and 113th Streets, and NE 113th St. between 20th and 23rd Avenues NE. It also includes minor ditch regrading on the south side of NE 117th St. between 16th Ave. NE and 23rd Ave. NE and at the intersection of 25th Avenue NE and NE 113th Street

Keith Ward (206) 615-0734

Venema Natural Drainage System Project

The Venema Natural Drainage System project will construct natural infrastructure to manage stormwater flow from an approximately 87-acre sub-basin of the Venema Creek Watershed, a tributary to Piper's Creek. The project includes drainage improvements on 12 city blocks. The project benefits Venema Creek by reducing the occurrence of large, fast flows of water that erode the creek channel, damaging habitat and transporting pollutants common to the urbanized, upper watershed areas. The project's natural infrastructure features swales, ponds, amended soils, increased vegetation and reduced impervious areas. These features serve to slow the stormwater down and give maximum opportunity for infiltration, giving pollutants time to settle out and helping to sustain creek flows and reduce water temperatures. SPU is partnering with Seattle Department of Transportation (SDOT) to provide neighborhood-scale improvements that integrate landscaping, traffic calming, and a sidewalk or walkway on most of the project blocks. The project is currently in the preliminary engineering phase, and construction is expected to begin in 2009.

Alan Lord (206) 684-0720

3.12.2 Thornton Creek Water Quality Channel

The purpose of this project is to use natural drainage system technology to provide water quality treatment in a highly urbanized area of the South Branch of Thornton Creek. Discharging to the South Branch of Thornton Creek, this site offers the last available opportunity to provide water quality treatment to this 670-acre drainage basin before stormwater reaches the creek. The project design diverts stormwater from the drainage pipe under NE 100th Street to a series of surface swales landscaped with amended soil and native plants to help clean, infiltrate and slow the stormwater before it reaches the creek. The channel will have water flowing in dry weather, as well as cleanse stormwater from the frequent storms. The existing storm drain pipe will stay in place to carry high storm flows when the channel cannot handle all the stormwater volume. The project design and construction will be coordinated with a new mixed-use development adjacent to the site and provide 2.7 acres of valuable open space for the Northgate community.

SPU has purchased the property and completed 60% Design. SPU has finalized a loan agreement with DOE for the construction budget. Construction is expected to begin in May 2007 and be substantially complete in October 2008.

Tom Fawthrop (206) 233-7265

3.12.3 Seattle Housing Authority and Sound Transit IDP Project

The Sound Transit (ST) and Seattle Housing Authority (SHA) Integrated Drainage Plan (IDP) Project will construct stormwater management facilities to meet the IDP requirements in the Lake Washington basin of the SHA Rainier Vista, SHA Holly Park Ph3, and ST South Corridor projects. SPU approved the use of an IDP for these three projects. An IDP substitutes on-site stormwater quality treatment for a project with construction of an off-site facility(s) within a basin draining to the same receiving water body. The off-site facility(s) is being designed to provide equivalent treatment for approximately 45 acres of vehicular impervious surface, the total area of the three projects which required water quality treatment per Seattle's Code.

Seven potential alternatives were identified during the planning and development process which concluded mid-2006. During preliminary engineering a final alternative will be determined. Preliminary engineering began in mid-2006 and is anticipated to be completed in 2007. Construction is anticipated to begin in 2009.

Judy Nishimoto (206) 733-9192

3.12.4 Urban Creeks – Urban Creeks Program

The Urban Creeks Program (previously known as the Urban Creeks Legacy Program) was initiated in 1999 to provide a holistic approach to managing stormwater drainage and improving habitat in Seattle's creeks. Working side-by-side with dedicated citizens, Seattle Public Utilities (SPU) achieved significant progress toward our program goals which include:

- Improving creek drainage and water quality systems;
- Improving natural creek habitat for fish and other wildlife;
- Enhancing creek health through stewardship and education; and
- Celebrating our creeks and the citizens who care for them.

Among the accomplishments during 2005:

Thornton Creek Watershed

- SPU and the Parks Department have agreed to purchase 1.0 acre of property near NE 98th and 20th Ave NE along the south branch of Thornton Creek for habitat. The property purchase will be completed in 2006.
- SPU continued work on the design of the Thornton Creek Water Quality Channel located close to Northgate near the South Branch of Thornton Creek (refer to previous section for a more detailed description).
- SPU continues plant establishment and monitoring near the three detention ponds and restored creek channel at Jackson Park Golf Course.
- SPU completed the third and final phase of restoration for Thornton Creek Park 6, a 6.5-acre natural area near the headwaters of the south branch. The 2005 project added large woody debris to the creek and removed 0.25-acres of invasive plants and added hundreds of native trees, shrubs and ferns.
- SPU created restoration designs for two sites on Thornton Creek – a natural area park just south of Jackson Park Golf Course and a natural area park at Sandpoint and NE

95th St. Both projects will add boulders and large woody debris to the creek to increase in-stream habitat.

Piper's Creek Watershed

- SPU continued work on a concept plan to build natural drainage systems in the Venema Creek drainage basin. The proposed project will benefit Venema and Piper's creeks by reducing the amount of flow and pollutants associated with urban runoff.
- SPU completed design of a fish passage project to address a barrier formed by a sewer line crossing and expanded the project to include additional instream habitat improvements.

Taylor Creek Watershed

- Completed designs to modify fish barriers under Rainier Ave S. SPU plans to construct this project in 2007.

Mapes Creek

- SPU worked with the Army Corps of Engineers to restore the mouth of Mapes Creek. The project is in the reconnaissance/concept stage. If approved for Army COE funding, the project will install a new dedicated pipe for creek water, daylight the lowest section of creek, and create a creek mouth/delta. The primary purpose of the project is to improve habitat to benefit juvenile chinook.

Green Seattle Partnership.

- The focus of SPU's 2005 work was to protect existing large trees, especially conifers, by removing ivy from trunks and the area above the root zones. The second focus was to plants thousands of conifer seedlings. Lastly, the project selected several sites for in-depth restoration. The program works in partnership with Seattle Parks Department, Cascade Land Conservancy and volunteers. The partnership members drafted a 20-year plan to guide restoration.

Chris Woelfel (206) 684-7599

3.12.5 Other Water Quality Projects

Jackson Park Detention

Three detention ponds with a total storage volume of 25 acre-feet were constructed adjacent to the north branch of Thornton Creek to reduce downstream flooding and erosion problems. To improve fish and wildlife habitat, approximately 2,300 feet of the creek channel was enhanced with large woody debris, rock and ponds. Native vegetation was planted and fish passage barriers removed. Approximately 2.5 acres of riparian wetland was created and enhanced with native vegetation. Design and restoration of golf course features were successfully coordinated with the Jackson Park Golf Course Master Plan to maintain playability, enhance the aesthetic appeal of the golf course, and increase efficiency of the irrigation system. This project was completed in 2003. Monitoring activities to fulfill permit requirements have been carried out since then. A total of 12 shallow groundwater monitoring wells were installed in May 2004 to monitor the wetland soil hydrology. The first annual monitoring report was submitted to Corps of Engineers on June 30, 2005. The second annual monitoring report was submitted to Corps of

Engineers in July 2006. During 2006, additional trees were planted in areas where the stream can be shaded by the trees.

Lilin Li (206) 684-7610

4. OTHER PERMIT REPORTING REQUIREMENTS

4.1 LEGAL AUTHORITY

Adequate legal authority to control discharges to and from Seattle's storm drainage systems has been established. In 2000, revisions were made to the City's Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 – 22.808). In August 2001, Ecology issued revised guidance in its Stormwater Management Manual for Western Washington. In early 2002, the City began a comprehensive comparison of its current set of Stormwater requirements to Ecology's newly revised guidance. In 2005 staff continued to evaluate and perform technical analysis required for upcoming code revisions.

4.2 IMPLEMENTING STORMWATER PROGRAM COMPONENTS

All program components have been implemented and are proceeding in accordance with the City's Stormwater Management Program (SWMP), as approved by Ecology on July 24, 1997.

4.3 KNOWN CHANGES IN WATER QUALITY

Based on the City's data, there were no known significant changes in the water quality of the City's receiving water bodies since the last update.

4.4 CONTROL OF INDUSTRIAL DISCHARGES INTO MS4S

Seattle's Stormwater, Grading and Drainage Control Code (SMC 22.800 – 22.808) prohibits most non-stormwater discharges from being introduced into the City's municipal storm sewer system, including harmful discharges from industrial activities. Seattle's Side Sewer Code (SMC 22.16.300) also prohibits discharging certain substances into the storm drain system. Additionally, as part of the City's Stormwater Pollution Prevention and Complaint Investigation Programs, Surface Water Quality Investigators conduct investigation when there is evidence of stormwater contamination originating from industrial discharges.

4.5 CHANGES IN PERMIT COVERAGE AREA

There were no changes in permit coverage area in 2005, and none are anticipated in 2006.

4.6 EXPENDITURES FOR STORMWATER PROGRAM

In July 1999, two years after Ecology approved Seattle's Stormwater Management Program, Seattle implemented a new financial management program called Summit. The primary driver behind the Summit Project was the year 2000 problem, which necessitated replacing the previous financial management program (Seattle Financial Management System, or SFMS). Transitioning from SFMS to Summit required developing an entirely new set of organizational, accounting and activity cost codes. In comparison to the data available when Seattle prepared its 1997 SWMP, the coding structure in Summit allows for a much more detailed accounting of budgeted and actual costs incurred. However, in many cases, specific stormwater program costs remain blended with other stormwater programs costs, making an accurate categorical breakdown difficult. This, coupled with organizational changes within SPU and other Seattle

Departments since the 1997 SWMP was drafted, means that estimating stormwater program expenditures is both an objective and subjective exercise.

Table 11 provides a rough approximation of the actual overall stormwater management budget. Many City Departments other that SPU and SDOT are involved in programs that could arguably be included in these estimates. A good example would be the joint effort between the Department of Parks and Recreation and Office of Sustainability and the Environment reducing the use of pesticides in City parks. However, in keeping with the methodology used in previous reports, the estimates below are based primarily on SPU and SDOT expenditures. In many cases, owing to the internal organization of SPU, many general management and support functions are jointly funded by drainage, drinking water, wastewater and solid waste funds. In these cases, an assumed fraction of the total costs (typically 25% - 30%) was allocated to stormwater-related programs. It is not intended that these estimates serve as a modification of budget estimates made in previous reports. Instead, these estimates should be viewed as a refinement of the estimate provided in the past, but still a macro-scale analysis of stormwater program operating costs.

Table 11. Overall Stormwater Management Program Budget (Actual Expenditures)

Program	**2005 Actual**	
Drainage O&M	$	3,179,000
Street O&M	$	1,189,000
Pollution Prevention Programs	$	661,000
Public Education Programs	$	609,000
Regulatory Development & Enforcement	$	761,000
Monitoring Program	$	313,000
Other Stormwater Program Costs	$	2,605,000
Overall Stormwater Program Budget	**$**	**9,317,000**

Drainage O&M: Includes SPU Field Operations Branch budgets for drainage inspection, drainage cleaning, and drainage repair, and an estimated portion of the overall branch support costs. Also included are expenses related to the spot drainage program conducted by SPU.

Street O&M: Includes SDOT budgets for mechanical street sweeping, street flushing, alley flushing, and snow/ice response. Not included in the above table are budgets for litter pick-up and illegal dumping.

Pollution Prevention Programs: Includes a variety of programs designed to reduce pollutants at their sources, primarily involving activities conducted by SPU's Community Services Division.

Public Involvement, Education & Stewardship Programs: Includes SPU's water quality and urban creek efforts such as the Seattle Schools programs, Urban Creeks and Watershed Stewardship programs, and Stormwater Outreach and Education programs.

Regulatory Development & Enforcement: Includes estimated SPU costs for water quality complaint investigations, and business inspections. It also includes the work begun in 2002 to compare Seattle's existing codes and technical standards to Ecology's 2001 Manual guidance.

Monitoring Program: Includes expenditures for surface water quality monitoring.

Other Stormwater Program Costs: Includes estimated proportions of general program management, WRIA Planning, and other support and planning costs. They do not include ESA programs.

Darla Inglis (206) 233-7160

4.7 REVISIONS TO FISCAL ANALYSIS

In accordance with Section S9 of Seattle's NPDES Municipal Stormwater permit, a permit modification is required if there is a greater than 20-percent difference between the *projected* annual budget value contained in the City's SWMP (Table 9.7 in the 1997 SWMP) and the actual budget *adopted* by the City Council for that year. The projected annual budgets contained in Seattle's 1997 SWMP ended with fiscal year of 2000. For comparison purposes, the projected figure for 2000 was $5,885,474.

5. CLOSING COMMENTS

Seattle's urban landscape differs from many surrounding communities in that *new development* is quite rare. Additionally, Seattle has a very low rate of *redevelopment*, where an urban property undergoes change but retains its urban land use. In fact, Seattle's rate of redevelopment is less than one percent per year. Furthermore, of these redevelopment projects, only a fraction of them are large enough to trigger regulations requiring stormwater treatment and/or flow control facilities. This means that while development regulations play a role in reducing adverse impacts of stormwater runoff, progress toward improving the quality of Seattle's urban must include:

- A suite of stormwater programs aimed at reducing pollutants at or near their sources;
- An on-going maintenance and operations program designed to keep our infrastructure operating properly; and
- A municipal capital improvement program based on placing the appropriate technologies at targeted locations.

Looking ahead, we are committed to better understanding how best to utilize the above techniques of urban stormwater management. Seattle, with its fully built urbanized environment, is in a distinctive position to implement and evaluate new and unique stormwater management strategies. In some areas of the City, for example where the drainage system is primarily ditches and culverts, an increasing emphasis is being placed on targeted retrofits using a natural system design approach. In other areas of the City, where more formalized curb and gutter drain systems are present, a set of programs focusing on infrastructure maintenance and pollution prevention actions may be the most cost-effective approach for improving water quality. Over time we will continue to adjust and enhance our efforts as our knowledge increases and the state-of-the-practice improves.

The City of Seattle has been involved in managing stormwater runoff since the late 1800s, when the first drainage systems were constructed in response to typhoid and diphtheria epidemics and recurring damage caused by flooding. Stormwater management has evolved since those early days, and the City has expanded the level of service beyond flood control and human health risks, embracing actions that aim to improve overall surface water quality and enhance aquatic habitats. We remain committed to meeting the challenges of managing stormwater in our urban environment today and into the future.

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Alphabetical listing of Stormwater Program Components

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APPENDICES

APPENDIX A - STORMWATER MANAGEMENT PROGRAM MANAGERS

Stormwater Management Program	**Program Manager**
Aquatic Community Assessment Program	Laura Reed (206) 615-0551
Basin & Creek GIS Delineation	Scott Reese (206) 733-9172
BMP Effectiveness Monitoring	Beth Schmoyer (206) 386-1199
Broadview Green Grid Project	Jim Johnson (206) 684-5829
Business Inspection Program	Ellen Stewart (206) 615-0023
Capital Improvement Programs	Darla Inglis (206) 233-7160
CIP Support & Effectiveness Monitoring	Ingrid Wertz (206) 386-0015
Creeks, Drainage, and Wastewater Citizen Advisory Committee	Carlton Stinson (206) 684-7624
Coho Pre-spawn Mortality Investigation	Laura Reed (206) 615-0551
Comprehensive Drainage Plan Update	Darla Inglis (206) 233-7160
Coordination among NPDES Municipal Stormwater Permittees	Darla Inglis (206) 233-7160
Creek Steward Program	Bob Spencer (206) 684-4163
Densmore Drainage Basin	Gary Schimek (206) 615-0519, Pat Murphy (206) 684-5186
Drainage Maintenance Crew Training – Standard Operating Procedures	Gary Lockwood (206) 684-7750
Drainage Plans and Permit Approval	Sherell Ehlers (206) 615-0040
Drainage System Inspection Program	Ellen Stewart (206) 615-0023, Louise Kulzer (206) 733-9162
Environmental Education Team	Mike Mercer (206) 684-0570
Environmental Grant Funding	Anthony Matlock (206) 386-9746
ESA Team	Jean White (206) 684-5185
GIS Support	Harvey Arnone (206) 233-0028, Stephen Beimborn (206) 233-0038
Green Gardening Program	Carl Woestwin (206) 684-4684
Green Home Kit Program	Michael Davis (206) 615-1376
Hazardous Material Inventory	Shab Zand (206) 233-5172
Hazardous Material Reduction	Shab Zand (206) 233-5172
High Point Project – A Natural Drainage Systems Approach	Jim Johnson (206) 684-5829
Household Hazardous Waste Program	Julie Vorhes (206) 615-0027
Hydrologic and Water Quality Monitoring of Natural Systems	Ingrid Wertz (206) 386-0015
Illegal Dumping	Alex Tonel (206) 684-4170
Interagency Resource for Achieving Cooperation	Ellen Stewart (206) 615-0023
Jackson Park Detention	Lilin Li (206) 684-7610
Lake Union Action Team	Darla Inglis (206) 233-7160
Local Hazardous Waste Management Program	Julie Vorhes (206) 615-0027
Longfellow Creek Watershed Project	Sheryl Shapiro (206) 615-
Lower Duwamish River Sediment Cleanup and Restoration	Martin Baker (206) 684-5984

Appendix A - Stormwater Management Program Managers (continued)

Stormwater Management Program	**Program Manager**
Lower Duwamish Waterway Source Control Program	Beth Schmoyer (206) 386-1199
Mutt Mitt Program	Carlton Stinson (206) 684-7624
Natural Lawn and Garden Care Campaign/Natural Soil Building	Carl Woestwin (206) 684-4684
Norfolk Drainage Basin	Gary Schimek (206) 615-0519, Beth Schmoyer (206) 386-1199
Operations & Maintenance of Drainage System	Pat Gorham (206) 386-9730
Operations and Maintenance of Roadways	Jim Dare (206) 684-5319
Pesticide Free Parks	Barb Decaro (206) 615-1660
Pesticide Reduction	Barb Decaro (206) 615-1660, Tracy Morgenstern (206) 386-4595
Pinehurst Green Grid Project	Keith Ward (206) 615-0734
Piper's Creek Watershed Project	Beth Miller (206) 684-0877
Precipitation Monitoring	Hai Bach (206) 684-5139
Pollution Prevention	Louise Kulzer (206) 733-9162
Resource Venture	Ellen Stewart (206) 615-0023
Restore Our Waters Strategy	Jean White (206) 684-5185
Seattle Housing Authority and Sound Transit IDP Project	Judy Nishimoto (206) 733-9192
Seattle Schools Program	Carlton Stinson (206) 684-7624
South Park Drainage Basin	Gary Schimek (206) 615-0519, Alan Lord (206)684-0720, Beth Schmoyer (206) 386-1199
SPU Environmental Compliance Audit Programs	John Labadie (206) 684-8311
SPU Spill Coordinator/Response Program	John Labadie (206) 684-8311
Storm Drain Stenciling	Carlton Stinson (206) 684-7624
Storm Event Sampling	Mike Hinson (206) 733-9134
Stormfilter Testing	Beth Schmoyer (206) 386-1199
Stormwater Outreach and Education	Carlton Stinson (206) 684-7624
Stormwater, Grading and Drainage Control Code and Directors' Rules	Robert Chandler (206) 386-4576
Street Sweeping Pilot Study	Keith Ward (206) 615-0734
Urban Watershed Business Unit	Gary Schimek (206) 615-0519
Surface Water Quality Database	Ellen Stewart (206) 615-0023
Taylor Creek and Deadhorse Canyon	Tom Gannon (206) 684-8565, Bob Spencer (206) 684-4163
Thornton Creek Drainage Basin	Gary Schimek (206) 615-0519
Thornton Creek Water Quality Channel	Jim Johnson (206) 684-5829
University of Washington Center for Water Resources	Darla Inglis (206) 233-7160
Urban Blueprint for Habitat Protection and Restoration	Jean White (206) 684-5185
Urban Creeks – Urban Creeks Program	Chris Woelfel (206) 684-7599
Urban Creeks and Watershed Stewardship Program	Kathy Minsch (206) 615-1441

Appendix A - Stormwater Management Program Managers (continued)

Stormwater Management Program	**Program Manager**
Venema Natural Drainage System Project	Alan Lord (206) 684-0720
Water Quality Complaints	Ellen Stewart (206) 615-0023
Watershed Forums	Jean White, WRIAs 8&9 (206) 684-5185; Scott Powell, WRIA 7 (206) 386-4582; Ed Connor, WRIAs 3&4 (206) 615-1128
Watershed Resource Inventory Area (WRIA) Coordination	Jean White, WRIAs 8&9 (206) 684-5185; Scott Powell, WRIA 7 (206) 386-4582; Ed Connor, WRIAs 3&4 (206) 615-1128

APPENDIX B – PERMIT REPORTING REQUIREMENTS CROSS-REFERENCE

The table below cross-references the reporting requirements contained in the 1995 NPDES Municipal Stormwater Permit with the appropriate sections contained in this report.

Permit Reporting Requirement	**Req't No.**	**Cross-referenced Section in this Report**
Status of implementing the components of the stormwater management program.	S10.B.1	3.1 - Comprehensive Stormwater Planning (p. 7) 3.3 - Regulations & Technical Standards (p. 16) 3.7 - Illicit Discharges (p. 36) 3.8 - Operations & Maintenance of Drainage System (p. 37) 3.9 - Operations and Maintenance of Roadways (p. 38) 3.10 - Municipal Training (p. 39) 3.11 - Information & Data Collection, Management & Analysis (p. 41) 3.12 - Capital Improvement Programs (p. 47) 4.1 - Legal Authority (p. 52)
Changes in permit coverage area:	S10.B.2	4.5 - Changes in Permit Coverage Area (p. 52)
Expenditures for stormwater program	S10.B.3	4.6 - Expenditures for Stormwater Program (p.52)
Revisions to fiscal analysis	S10.B.4	4.7 - Revisions to Fiscal Analysis (p. 54)
Summary and analysis of cumulative monitoring data (4th Year Report only)	S10.B.5	Not applicable
Summary of compliance activities, inspections, and education activities	S10.B.6	3.4 - Permitting, Inspections & Enforcement (p. 16) 3.4.7 - Lower Duwamish Waterway Source Control Program(p. 21) 3.6 - Public Involvement, Education, Stewardship (p. 28)
Known changes in water quality	S10.B.7	4.3 - Known Changes in Water Quality (p. 52)
Status of watershed-wide coordination activities	S10.B.8	3.2 - Partnerships (p. 11)